BRITISH MEDICAL JOURNAL

LONDON SATURDAY JULY 26 1958

EXPECTATION OF LIFE AND MORTALITY FROM CANCER AMONG BRITISH RADIOLOGISTS

BY

W. M. COURT BROWN, M.B., B.Sc., F.F.R.

Director of the Medical Research Council's Group for Research on the General Effects of Radiation, Western General Hospital, Edinburgh

AND

R. DOLL, M.D., D.Sc., F.R.C.P.

Deputy Director of the Medical Research Council's Statistical Research Unit, London School of Hygiene and Tropical Medicine

It has been stated, in a report on "The Biological Effects of Atomic Radiation" by the United States National Academy of Sciences (1956), that the average age at death of American radiologists was about 5 years less than the average age at death of American physicians having no known professional contact with radiation. It was inferred from this finding that exposure to the levels of radiation dose which are received under occupational conditions would result in a reduction in the expectation of life, in the same way as the longevity of animals is reduced by large doses of whole-body radiation given at a high dose rate. Others have claimed that, in this respect, the action of radiation is non-specific and that exposure to even very low doses confers some degree of general unfitness to survive. In explanation, it has been suggested that radiation leads to an accelerated rate of senescence due to the accumulation of genetic damage in the somatic tissues (Failla, 1957; Henshaw, 1957).

The present report stems, in its inception, from the various studies that have been made on American radiologists, and gives the causes of death among a similar group of British radiologists during a 60-year period from 1897 to 1956. The investigation had two objects: firstly, to see whether there was evidence for a decrease in the expectation of life as the result of a non-specific ageing effect, and, secondly, to examine the mortality of British radiologists from cancer.

The Study Population

Through the co-operation of the Council of the British Institute of Radiology and the Council of the Faculty of Radiologists, lists were compiled of the members of each society who had a medical or a dental qualification. In subsequent descriptions members with dental qualifications have been classed with the medical members, whether or not they also had a medical qualification.

For the British Institute of Radiology, the lists were made retrospective to 1897, which was the foundation year of its precursor the *X*-ray Society, the first radiological society in the world. Soon after its foundation the name of the *X*-ray Society was changed to the Röntgen Society, and in 1927 this society amalgamated with the British Institute of Radiology, which had been founded separately in 1922, to form the present institute. For the Faculty of Radiologists, lists of members were obtained from the date of its foundation in 1939 and also from the records of its antecedent societies, the British Association of Radiologists and the Society of Radiotherapists of Great Britain and Ireland, which were founded respectively in 1934 and 1935.

The period over which the data were collected includes the period of the early development of medical radiology, and consequently the persons studied include a large proportion, and probably the great majority, of the pioneer British radiologists, many of whom unwittingly exposed themselves to excessive amounts of radiation.

The lists contained the names of all who joined the societies up to December 31, 1954, and altogether records were obtained of 2,035 medical and dental members; 1,461 of these, on the basis of initial addresses in Britain or Eire or of belonging to the Colonial or Armed Services, were regarded as constituting the "Home" population. For simplicity of analysis, the few women in the population (80) were excluded and the study was limited to an analysis of the mortality among the 1,381 men in the "Home" population.

For each member of the population the following data were recorded:

Name and qualifications; address on entry and last known address; sex; date of birth; date of joining one of the societies; status on January 1, 1957; and (if dead) the date and cause of death.

The information required had to be obtained from a number of sources. It was sought primarily from the records of the societies, but when these were inadequate it was sought in the records of the General Register Office, the General Medical Council, the British Medical Association, other professional organizations, or the hospitals in which the members worked. In a few instances information was obtained direct from the member himself, or from other members or relatives. Whenever a member was known to have died, a copy was obtained of the cause of death entered on the death

certificate. This last information was omitted in a few cases in which the member was reported to have died abroad and there was little doubt about the cause of death—e.g., accidental death or death through enemy action. It proved possible to trace all but four members of the male population, and the subsequent analyses are therefore based on the 1,377 males whose status was known on January 1, 1957. The fact that those whose deaths had not been recorded were alive after this date was confirmed by (1) personal contact or (2) discovering that they had subsequently paid a subscription to one or other medical society.* The majority (probably the great majority) of these men were or are engaged in the practice of diagnostic radiology, and the group as a whole may be regarded as a group of radiologists.

It seems likely that most full-time radiologists in Britain and Eire are, or have been, members of one or other society. The survey is, however, deficient in that it does not include a number of radiologists—mostly perhaps part-time—who have not been members of either society. It is also possible that in the past such people may have been those least protected from radiation. Some indication that such workers have been overlooked arose when, during the course of the survey, the records were brought to our notice of a part-time diagnostic radiologist who recently died from aplastic anaemia and who had never been a member of either of the two societies.

The Extent of Radiation Exposure

It is only recently that active steps have been taken to record the amounts of exposure received by the staffs of radiological departments. Available evidence suggests that exposure, under modern conditions, is almost always well below the weekly maximum permissible dose of 0.3 r (Godfrey, Osborn, and Templeton, 1957). This, however, has not always been the case, and during its formative years medical radiology was often practised without any protective measures being taken. In the earliest days it was common practice for a radiologist to test the condition of his *x*-ray tube by the deliberate exposure of his hands, and he assessed the state of the tube by the density of the shadows of his hand bones cast on a fluorescent screen.

Hunter (1955) states that protective clothing was introduced in 1903, and Cuthbert Andrews (personal communication) says that by 1909 the wearing of such clothing was a fairly general practice. The clothing was clumsy and bulky to wear, and to obviate this steps were taken, during the first world war, to incorporate protective shielding into the *x*-ray equipment. In spite of this, radiation damage continued to occur, and in 1921 the British *X*-ray and Radium Protection Committee was formed as the result of co-operative action between the Royal Society of Medicine, the Röntgen Society, and a number of other interested bodies. This committee issued its first recommendations in July, 1921. There is reason to believe that the action of the committee was fairly quickly effective in arresting the sequence of casualties to *x*-ray and radium workers. In this survey, therefore, the study population has been divided into those members entering before 1921 and those joining one or other society in 1921 or afterwards. It is assumed that those joining after 1920 would on the whole commence the practice of radiology under recognized conditions of protection, and the comparison of these two sections of the population should be of value in ascertaining whether any significant radiation effects had occurred.

There is little point in attempting to assess the total exposure to radiation of individual members. No data exist which permit such estimates to be made with any confidence. It seems reasonable, however, to proceed on the assumption that the average exposure of the pre-1921 members was excessively high, and that the average exposure of the post-1920 members has been within the various permissible limits that have been recommended.

Calculation of the Expected Mortality

To calculate the mortality expected among the members of the societies it is necessary to know the population at risk at each age and in each year from the date when the first members joined the first society (1897) until the end of the period of observation (December 31, 1956). Members were regarded as being at risk from the year in which they first entered a society until either their year of death or the end of 1956, whichever was the earlier, irrespective of the actual length of time membership may have continued. Each member was considered as being at risk for half a year in the year in which he first entered, and, in the event of death, for a similar period in the year in which he died. Members entered the population and deaths occurred more or less equally in each month, so that both events may be regarded as having occurred, on average, at mid-year. The population at risk was then obtained by counting the members at risk at each year of age and for each year from 1897 to 1956, and then adding in each five-year age group the numbers of "man-years" at risk for the period 1897 to 1915, for the quinquennia from 1916 to 1950, and lastly for the period 1951 to 1956.† Separate counts were made for the members who first entered the population before January 1, 1921, and for those joining on or after that date. The numbers of man-years at risk in each five-year age period and for each period studied are shown separately in Table I.

The expected numbers of deaths were estimated, as a first approximation, by assuming that the mortality should be the same as that recorded for all men in England and Wales in the same age groups and over the same periods of time. The numbers of man-years at risk were therefore multiplied by the corresponding age-specific male death rates (McKenzie, Case, and Pearson, 1957), and the total numbers of deaths expected were obtained by adding together the results for all the age groups.

These figures are, however, not the best estimates which can be made, as over the years there has been an appreciable difference between the mortality experience of different socio-economic classes and of different occupational classes. These differences can be allowed for by utilizing the data published in the Registrar-General's Occupational Mortality Supplements. Data have been published for the periods 1910–12, 1921–3, 1930–2, and 1949–53 (Registrar-General, 1923, 1927, 1938, 1958), and they are given separately for different social and occupational classes (including the medical profession). The data are also published in each instance for various age groups up to and including those 75 years of age and over. Some slight variations were made in the definition of the first socio-economic class in the different reports, but in general the class has corresponded to the members of the major professions, senior business executives, etc.

It is reasonable to suppose that the mortality of radiologists would most closely correspond to that of the first social class, which includes all members of the medical profession. The mortality of doctors as a whole has, however, differed appreciably from that of this class. To some extent this may be the result of specific risks associated with general practice, and it is possible that the conditions of life of men in social class I provide a better indication of the conditions of life of radiologists (apart from the latter's specific radiation exposure) than the conditions for the medical profession as a whole. Separate estimates have therefore been made of the total numbers of deaths which

*Except in one instance, when the only evidence that the member was alive later than 1954 was that his address was given in the British and Canadian Medical Directories. He joined the institute in 1949, when aged 30 years.

†These periods were chosen for convenience, since age-specific death rates have been published by McKenzie, Case, and Pearson (1957) for cancer of various sites for quinquennia from the period 1911–15.

would have been expected if the mortality of the members of the radiological societies had corresponded on the one hand to that of doctors and on the other to that of men in social class I.

To make the necessary corrections the mortality rates at each Census period were calculated for male doctors and for men in social class I for each age group for which data were given. These were expressed as percentages of the corresponding rates for all men during the same period, and the estimates of the correcting factors required for each of the periods studied were obtained by interpolation. Thus in 1921–3 the mortality of men in social class I aged 55 to 64 years was 88% of the general male population; in the period of 1930–2 it was 95%. Therefore in the quinquennium 1926–30 the correcting factor for social class at ages 55 to 64 years was taken to be $\{88+6/9\ (95-88)\}/100$ or 93%. The numbers of deaths expected in each age group calculated on the mortality rates for England and Wales were multiplied by the corresponding correcting factors, and the results summed for all ages and periods to give the corrected estimates of the total mortality (estimates B in Tables II, III, and IV).

These corrections are, however, less satisfactory than might be thought. The reason lies in the fact that above the age of 65 years the Registrar-General's occupational mortality rates are increasingly biased, because a proportion of retired men fail to give their last occupation on the Census schedule, whereas this is nearly always obtained by the Registrar on the registration of a death. As a result the mortality of all occupations (and of all social classes) is artificially increased in the older age groups, while a very low mortality is recorded for men classified as being unoccupied. This factor cannot be ignored, though it is perhaps less likely to affect the recorded mortality for doctors and for men in social class I generally than for men in most other occupations. It has therefore been thought wise to make a second estimate of the corrected mortality (for both social class and occupation) on the assumption that the mortality at ages over 65 years bears the same relationship to that for all men as does the mortality at ages 55 to 64 years—the oldest age group for which the data can be relied on with confidence (estimates A in Tables II, III, and IV).

The total numbers of deaths expected to be attributed to all types of cancer, and the appropriate corrections for occupation and social class, were calculated by the same method. Data are not available in the same detail to enable similar estimates to be made for expected cancer mortality at specific sites, and a more approximate method was used for this purpose. The numbers of expected deaths were calculated from the national mortality rates in the same way, but in deriving correction factors for social class age was ignored, and the appropriate factors for each

TABLE I.—*Number of Years Lived in Five-year Age Groups by Radiologists who Came Under Observation Before or After the Beginning of* 1921

Group of Radiologists	Age (Years)	No. of Man-years at Risk During								
		1897–1915	1916–20	1921–5	1926–30	1931–5	1936–40	1941–5	1946–50	1951–6
Joined Society before January 1, 1921	20–	7	2	0	0	0	0	0	0	0
	25–	82	16	5	0	0	0	0	0	0
	30–	225	58	65	5	0	0	0	0	0
	35–	410	110	105	65	5	0	0	0	0
	40–	527	188	170	102	65	5	0	0	0
	45–	532	230	244	164	101	65	5	0	0
	50–	433	232	248	231	161	99	65	5	0
	55–	299	187	236	224	209	147	97	65	5
	60–	148	142	178	201	197	187	118	89	61
	65–	60	74	121	148	152	164	144	87	102
	70–	18	21	48	88	108	117	129	116	81
	75–	6	4	5	31	56	65	80	93	72
	80–	5	1	4	1	12	33	31	35	47
	85 or above	4	1	1	2	1	6	23	28	32
	All ages	2,756	1,266	1,430	1,262	1,067	888	692	518	400
Joined Society on or after January 1, 1921	20–	—	—	1	2	4	0	2	2	1
	25–	—	—	18	77	62	48	47	106	52
	30–	—	—	53	177	225	201	232	366	568
	35–	—	—	41	198	315	346	314	522	944
	40–	—	—	55	165	315	394	431	381	839
	45–	—	—	31	150	215	362	423	503	545
	50–	—	—	16	100	178	239	377	459	645
	55–	—	—	12	47	106	186	239	359	561
	60–	—	—	12	36	67	108	164	226	407
	65–	—	—	1	16	43	68	101	141	238
	70–	—	—	0	6	12	39	52	88	140
	75–	—	—	0	0	5	7	26	38	98
	80–	—	—	0	0	0	1	2	11	35
	85 or above	—	—	0	0	0	0	1	0	7
	All ages	—	—	240	974	1,547	1,999	2,411	3,202	5,080

TABLE II.—*Numbers of Deaths from All Causes: Observed and Expected, by Date of Death*

Period	Pre-1921 Population				Post-1920 Population			
	No. of Deaths Observed	No. of Deaths Expected from Mortality of			No. of Deaths Observed	No. of Deaths Expected from Mortality of		
		General Population	Men in Social Class I A* B*	Doctors A* B*		General Population	Men in Social Class I A* B*	Doctors A* B*
1897–1915	26	44	39 – 39	40 – 40	—	—	— —	— —
1916–20	21	25	22 – 22	24 – 24	—	—	— —	— —
1921–5	27	29	26 – 27	31 – 30	0	2	2 – 2	2 – 2
1926–30	46	35	32 – 33	38 – 36	6	9	8 – 8	9 – 9
1931–5	31	37	35 – 36	40 – 38	13	16	14 – 15	17 – 16
1936–40	41	42	40 – 42	44 – 43	23	25	23 – 23	25 – 25
1941–5	38	39	38 – 41	38 – 39	30	32	30 – 31	31 – 31
1946–50	35	37	37 – 41	35 – 37	37	42	41 – 42	39 – 39
1951–6	37	36	37 – 41	33 – 37	52	75	75 – 79	68 – 71
All periods ..	302	324	306 – 322	322 – 323	161	201	193 – 200	192 – 193

* Estimates made on different assumptions about the relative mortality of men in these social groups aged 65 years and over: see section on "Calculation of the expected mortality."

period were obtained by interpolation from the standardized mortality ratios for ages 20 to 64 years published by the Registrar-General.* For example, the standardized mortality ratio for cancer of the stomach was 60% for social class I in 1921–3 and 55% in 1930–2; the correcting factor for the quinquennium 1926–30 was therefore calculated to be {60+6/9 (55–60)}/100 or 57%. No figures are available for the years prior to 1921, and the standardized ratios for 1921–3 have been taken as the correcting factors for all the preceding years. In the case of leukaemia the earliest available figure was 163% in 1930–2.

The Expectation of Life

Results

The numbers of deaths reported among those members who entered the population before January 1, 1921 (the "pre-1921 population"), and among those who entered in 1921 or later (the "post-1920 population") are shown in Table II separately for nine periods between 1897–1915 and 1951–56. The numbers of deaths in each group are compared with the numbers which it is estimated would have occurred among comparable groups representative of (1) all men in England and Wales, (2) men in social class I, and (3) male doctors. For reasons which have been stated previously two sets of figures are given for the expected numbers of deaths for men in the last two categories, and it is likely that the best estimate lies somewhere between them. The total numbers of deaths for each of the two populations are shown in Table III, subdivided according

TABLE III.—*Number of Deaths from Cancer and Other Causes: Observed and Expected, All Periods*

Group of Radiologists	Cause of Death	No. of Deaths Observed	No. of Deaths Expected from Mortality of		
			General Population	Men in Social Class I A*	Men in Social Class I B*	Doctors A*	Doctors B*
Pre-1921	Cancer	55	48	42 – 47		35 – 42	
	Other cause	247†	276	264 – 275		287 – 281	
	All causes	302	324	306 – 322		322 – 323	
Post-1920	Cancer	24	38	36 – 37		26 – 29	
	Other cause	137	163	157 – 163		166 – 164	
	All causes	161	201	193 – 200		192 – 193	
All members	Cancer	79	86	78 – 84		61 – 71	
	Other cause	384†	439	421 – 438		453 – 445	
	All causes	463	525	499 – 522		514 – 516	

* See footnote to Table II.
† Including two deaths attributed to aplastic anaemia and one death for which information about the cause was not obtained.

to whether the deaths were attributed to cancer or to other causes. It is clear that the total of observed deaths (463) is less than would have been expected if the members had suffered a mortality similar to that experienced by all men in England and Wales over the same period (525). It is also less than expected for men either of the same social class (499 to 522) or of the same profession (514 to 516). If the deaths attributed to cancer are excluded the relative differences between the observed and expected numbers of deaths are more marked, and the difference from the smallest number which could reasonably be expected approaches statistical significance (observed 384, expected 421; P=0.07).

When the radiologists who joined before and after January 1, 1921, are examined separately it is found that the actual number of deaths was less than the expected number in both groups and that the deficiency was more marked among those who joined later. In the pre-1921 group, however, there was a small excess of deaths due to cancer, and if these are excluded the deficiency of deaths due to other causes is of the same order in both the groups.

*The standardized mortality ratios published for 1930-2 are for the age group 35 to 64 years and these ratios have been used for this period.

These findings should not be interpreted to mean that radiologists have an increased life expectancy as a result of their occupation. A large part of the deficiency is contributed by the experience of the first few years, and much of this is likely to be an artifact due to the exclusion of men who were particularly unhealthy. It is common actuarial experience that men who voluntarily join some organization have a healthier record than average for a few years, because those who know they are seriously ill tend not to undertake new responsibilities. In the course of time the effect of this type of selection must be expected to disappear, and it is unlikely to be appreciable after five years (Jordan, 1952). Whether it has contributed to the present results can be tested by calculating separately the number of deaths expected to occur within the first five years of joining one or other society. When this is done it appears that the deaths observed during this period were markedly fewer than those expected (24 against 42 expected on the basis of the national rates); it would therefore seem reasonable to exclude this part of each individual's membership from the study. The results obtained by so doing are shown in Table IV. The total mortality is still lower

TABLE IV.—*Numbers of Deaths from Cancer and Other Causes: Observed and Expected, First Five Years at Risk Excluded*

Group of Radiologists	Cause of Death	No. of Deaths Observed	No. of Deaths Expected from Mortality of				
			General Popula-	Men in Social Class I A*	Men in Social Class I B*	Doctors A*	Doctors B*
Pre-1921	Cancer	54	46	41 – 46		34 – 41	
	Other cause	239†	261	251 – 262		273 – 267	
	All causes	293	307	292 – 308		307 – 308	
Post-1920	Cancer	22	35	32 – 34		23 – 26	
	Other cause	124	141	139 – 144		145 – 143	
	All causes	146	176	171 – 178		168 – 169	
All members	Cancer	76	81	73 – 80		57 – 67	
	Other cause	363†	402	390 – 406		418 – 410	
	All causes	439	483	463 – 486		475 – 477	

* See footnote to Table II. † See footnote to Table III.

than that expected from the experience of comparable social and professional groups (439 deaths against the lowest estimate of the expected number of 463), and the mortality from causes other than cancer is also lower than that expected—though now clearly not significantly lower (observed deaths 363, least number of expected deaths 390; P=0.17).

The slight deficiency of deaths due to causes other than cancer could have arisen because of an inadequate correction for social class and occupation. The correction for class and occupation could not be very accurate, as so many of the deaths occurred at ages 65 years and over and the occupational mortality data available for these ages are known to be unreliable. There has, however, been little change in life expectancy at these older ages over the last half-century, and it seems unlikely that social factors can have had a greater effect on mortality in this age group than at ages 55 to 64 years. It is believed, therefore, that the alternative method which has been used for correcting for social factors will have over-corrected rather than under-corrected the expected mortality. That the deficiency is not due to an error of this type is, moreover, suggested by examination of the mortality among men aged 45 to 64 years. Men in this age group will have had the maximum exposure to occupational radiation, and the corresponding correcting factors for social class and occupation are believed to be reliable. The results for this age group, after exclusion of the deaths which occurred during the first five years of membership, are shown in Table V. It is clear that in this group also there is no evidence of any excess mortality from causes other than cancer among either the pre-1921 or the post-1920 radiologists.

TABLE V.—*Number of Deaths from Cancer and Other Causes, Men Aged 45–64 Years: Observed and Expected, First Five Years at Risk Excluded*

Group of Radiologists	Cause of Death	No. of Deaths Observed	No. of Deaths Expected from Mortality of		
			General Population	Men in Social Class I	Doctors
Pre-1921	Cancer	22	18	16	14
	Other cause	69	82	76	88
	All causes	91	100	92	102
Post-1920	Cancer	13	19	17	12
	Other cause	63	67	65	70
	All causes	76	86	82	82
All members	Cancer	35	37	33	26
	Other cause	132	149	141	158
	All causes	167	186	174	184

Another explanation for the difference could be that the standard chosen for comparison was unsuitable. It is conceivable that, apart from the radiation to which they are exposed, radiologists may constitute a particularly sheltered group with a favourable expectation of life. It is, however, difficult to believe that any such added advantage over other doctors and other men of the same social class could be so great as to outweigh a substantial occupational hazard due to radiation.

Discussion

Experimentally it has been shown by several workers that a single sublethal dose of whole-body radiation shortens the average expectation of life of exposed animals. Experiments on rats and mice have shown that for such doses the reduction in life-expectancy is of the order of 25 to 50% per 1,000 r. Furthermore, it has been considered that the amount of shortening is proportional to the dose received. Mole (1957) has reviewed the existing experimental data on the effect of chronic irradiation on animals—that is, daily exposure, five, six, or seven days a week at dose levels permitting survival for at least six months. With doses of γ-rays, or their equivalent in fast neutrons, of 10 r per week or more there is a demonstrable and significantly reduced expectation of life. For doses of less than 10 r per week the position is equivocal, and in none of the nine reported studies at such low dose rates do the life-expectancies of the experimental groups differ significantly from the controls.

There has, however, been a tendency to draw conclusions about the possible effects of really low radiation doses from the effects observed to follow either single sublethal doses or chronic exposure at comparatively high dose rates. To effect such extrapolations Blair (1956), in particular, has developed a general mathematical theory of the effect of radiation on life expectancy, and, using this theory, Hursh (1956) has calculated that a man exposed to 0.3 r per week —the maximal permissible dose—for 20 years would suffer, in an expected life-span of 65 years, a reduction of life expectancy of two years. Jones (1957) has stated that he considers that in man a whole-body dose of 1 r will reduce the expectation of life by about five days. Failla and McClement (1957) have re-examined the theoretical background of the deductions from animal studies about the possible effects of low-dose exposure in man, and they have suggested that, so long as the exposure rate does not exceed 0.5 r per day, the reduction in life-expectancy per r of whole-body dose is likely to be one day.

There can, however, be no substitute for observations made directly on man. Warren (1956) studied the average age at death of American radiologists and claimed that the finding of a reduction of about five years in comparison with physicians not practising radiology was evidence of an ageing effect of radiation. He thought also that, as the average age at death was reduced for each of the several causes of death studied, the effect was non-specific. The use of the average age at death as a biological indicator can, however, be justified only if the contrasted populations (1) have a similar distribution of ages at entry, (2) have a similar rate of loss from all causes other than death, and (3) are studied over the same period. In the comparison which has been made between radiologists and non-radiological physicians these conditions have not been met. Since radiology requires postgraduate study the age at entry is raised and the proportion of radiologists in the youngest medical age group is small. Since radiology is a young and growing specialty, the proportion of radiologists in the oldest age group is also small. Hence the test used by Warren—a comparison of their average ages—suggested that the groups were comparable when in fact, as Seltser and Sartwell (1958) have shown, there is a difference in the age distribution of the groups which is sufficient to account for the whole of the reported difference in the average age at death. It must be concluded, therefore, that Warren's data are not evidence of a reduction in longevity consequent upon occupational exposure to radiation.

Dublin and Spiegelman (1948) reported that the mortality of American specialists in radiology was less than that for all physicians—that is, 90%—but slightly more than that for all specialists (which was 78% of the rate for all physicians). Only 95 deaths were, however, recorded among the radiologists, and the differences are not large enough to be significant.

The mortality data for British radiologists, published by the Registrar-General for England and Wales (1958), relate to even smaller numbers. It may be noted, however, that only eight deaths were recorded among radiologists aged 20–64 years between 1949 and 1953, when the number expected from the rate for all occupied and retired men was 12. The standardized mortality ratio of approximately 70% compares with ratios of 89% for all doctors and 98% for all men in social class I.

The most reasonable interpretation of the results of the present study is that the expectation of life of British radiologists is similar to that of other men of comparable status and has not been substantially altered by their occupational exposure to radiation. This negative finding is all the more striking when the analysis is confined to those radiologists entering the population before 1921. This group of men contains the pioneer radiologists, and an analysis of the deaths from skin cancer (see below) provides good evidence that these men suffered excessive exposure, at least to their limbs.

It may be argued on theoretical grounds that an analysis of the deaths from all causes does not necessarily provide a true indication of whether a group of men is ageing at an accelerated rate. Certainly the process of ageing and the fact of death may be dissociated, and it is possible to visualize circumstances—for example, the outbreak of a severe epidemic causing a high proportion of deaths—in which the total number of deaths would provide a very inadequate measure of the ageing process. Under modern conditions, however, and in the absence of a direct measure, it is reasonable to accept the mortality rate from all causes as a first approximation to the rate of ageing. It can be held, therefore, that the present study provides no evidence of an ageing effect in man under the circumstances of radiation exposure examined. If such an effect does exist, it is apparent that in the case of radiologists it must be very small.

The Mortality from Cancer

Results

The numbers of deaths attributed to cancers of all types and the corresponding expected numbers are shown in Table III. The total cancer mortality is close to that which would have occurred among men of similar social class (79 deaths against an estimate of between 78 and 84), but it is slightly more than would have been expected from

comparison with the cancer mortality of doctors—that is, between 61 and 71. When, however, the population is divided according to the date of joining one or other society, it is seen that there is no reason to suppose that there has been any excess among those joining after 1920; there may, however, have been an appreciable excess among those joining in the earlier years. Among this group 55 deaths were attributed to cancer, and the lowest estimate of the mortality expected among a comparable group of doctors is 35 ($P<0.01$). Exclusion of the first five years at risk makes no appreciable difference to the results (Table IV).

TABLE VI.—*Numbers of Deaths from Cancer of Different Types: Observed and Expected, All Periods*

Type of Primary Cancer	Pre-1921 Radiologists			Post-1920 Radiologists			All Members		
	Obs. No. of Dths.	No. Expected from		Obs. No. of Dths.	No. Expected from		Obs. No. of Dths.	No. Expected from	
		Gen. Popn.	Soc. Cl. I		Gen. Popn.	Soc. Cl. I		Gen. Popn.	Soc. Cl. I
Stomach	8	9·9	5·6	2	7·3	4·2	10	17·2	9·8
Intestines and rectum ..	9	10·9	11·2	5	6·7	6·9	14	17·6	18·1
Pancreas	6	1·4	1·6	1	1·3	1·6	7	2·7	3·2
Lung ..	5	3·2	3·0	7	9·0	7·6	12	12·2	10·6
Skin ..	6	1·0	0·6	1	0·4	0·2	7	1·4	0·8
Leukaemia	2	0·3	0·5	1	0·7	0·9	3	1·0	1·4
Other ..	19	21·0	18·4	7	12·9	13·5	26	33·9	31·9
All types	55	47·7	40·9	24	38·3	34·9	79	86·0	75·8

The numbers of deaths attributed to cancer of different primary sites are shown in Table VI, in comparison with the numbers expected from (1) the mortality of all men in England and Wales, and (2) the mortality of men in social class I. As has been stated previously, it was not possible to make separate estimates of the mortalities to be expected specifically among doctors, and the estimates of the deaths which would have occurred among men in social class I have been made with a less detailed method than that used to derive the figures in the previous Tables. The estimates for the total numbers of cancers of all sites shown in Table VI had also to be made by the same methods and the figures for total cancers are therefore slightly different from those in Table III. The numbers of cases of each type of cancer are so small that it would be possible to recognize only gross differences in mortality, and small inaccuracies in the estimates of the expected numbers are unimportant.

No appreciable difference is made to the results by omitting the experience of the first five years' membership. One cancer death (due to cancer of the stomach) occurred in this period among the pre-1921 members, and the expected number of deaths for each site is reduced by about 4%. Two deaths (due to cancer of the pancreas and to a cerebral tumour) occurred among the post-1920 group, and the expected numbers of deaths are each reduced by about 10%.

From the data in Table VI there is no reason to believe that there has been any excess of cancer of any particular type among the post-1920 population; it should, however, be noted that the one death attributed to skin cancer was due to a typical radiation cancer of the fingers. Among the pre-1921 members the number of deaths from cancer of the skin was significantly greater than the expected social class mortality ($P<0.001$), and there is also evidence of an excess of deaths from cancer of the pancreas ($P<0.01$). Only two deaths were attributed to leukaemia; the disease, however, was seldom recognized in the early part of this century, and less than one case would have been expected (expected number 0.5, $P=0.09$). For other types of cancer, considered either as a group or individually, the numbers are close to those which it is estimated would have occurred among comparable non-radiological populations.

Other data for cancer in radiologists are few. Cases of skin cancer among the early radiologists have been reported by many authors, and there can be no doubt that the incidence was increased in several countries. There are good grounds for believing that there was also an excessive incidence of leukaemia among radiologists in the U.S.A. (Dublin and Spiegelman, 1948; March, 1950). The mortality from types of cancer other than leukaemia was also slightly raised in Dublin and Spiegelman's study (133% for radiologists and 98% for all specialists against a standard of 100% for all doctors). The number of deaths from cancer other than leukaemia was, however, very small (13), and data were not given separately for the different types of the disease. Of the eight deaths among British radiologists reported by the Registrar-General (1958), one was attributed to cancer of the lung and one to leukaemia.

That ionizing radiations are an aetiological factor in certain forms of human cancer is well established. There is no doubt that radiations can induce tumours of the skin, bone, bone marrow, thyroid, and pharynx. There is reason to believe that tumours of other sites can also be induced, although the human evidence for this is not so strong. Animal studies, however, provide evidence that radiations can induce tumours in many deeply seated organs. It is of some importance, therefore, to find no evidence of an excess of cancer at any site in the post-1920 population. This presumably reflects the adequacy of the protective measures that have been recommended, but it is too early to be certain that they are wholly adequate, since half the members of this group have been observed for less than 15 years, and induction periods of 15 to 20 years and longer have been recorded for many radiation-induced tumours.

The study of the pre-1921 population reveals that the excess of cancers can be ascribed to an increased mortality from tumours of three particular sites: the skin, the bone marrow, and the pancreas.

The excess mortality from skin cancer is in keeping with the numerous reports of the development of tumours in skin showing evidence of radiation damage. In addition to the six cases in which death was ascribed to skin cancer, there are two in which this tumour is recorded as an associated cause. Records were also obtained, during the course of the survey, of a further 15 cases of severe damage to the skin of the hands, face, and legs. Many of these will have had associated tumours, and it is reasonable to assume that even this number is not comprehensive.

The increase in the mortality from leukaemia is appreciably less than might have been expected on the basis of the data for American radiologists. This is perhaps not so surprising as might appear at first sight. There seems little doubt that in Britain protective measures were introduced at a very early stage in the development of radiology: firstly, the use of heavy protective clothing, and, secondly, the combination of lighter apparel with shielding incorporated into the *x*-ray apparatus. These measures, coupled with the fact that *x*-ray beams of low penetrability were used and that only a small number of persons were at risk in the very early days, may explain the failure to find any large excess of deaths attributed to leukaemia. It has, however, already been pointed out that leukaemia was comparatively seldom diagnosed during the early part of the century, and it is worth noting that in two cases death was ascribed to aplastic anaemia. Both individuals concerned entered the population before 1921, and the deaths occurred in 1921 and in 1941. In the first case the illness is described as being of only a few weeks' duration; in neither case has it proved possible to check the validity of the death-certificate diagnosis. From previous experience (Court Brown and Doll, 1957) it appears that many cases in people suffering considerable radiation exposure may be examples of acute aleukaemic leukaemia, and it is possible that one or both cases may fall into this category.

There remains the unexpected finding of a significantly increased mortality from cancer of the pancreas. The fact that this occurs in the heavily exposed section of the population suggests that it may be related to radiation exposure. The pancreas is, however, a deeply seated organ and would of necessity have received proportionately smaller doses than the bone marrow. It would therefore have to be

postulated that the pancreas possessed a most unusual degree of sensitivity to radiation carcinogenesis. In the absence of supporting data it would be unwise to conclude that this increased mortality is a specific radiation effect. If confirmatory data are not forthcoming it may be presumed that the present findings are due to the operation of chance.

Applicability of the Findings

It is clear that under modern working conditions—that is, the provision of and adherence to adequate protective measures—the personnel of medical radiological departments have not run any substantial risk of (1) a reduction in the expectation of life from a non-specific ageing effect, or (2) an increased mortality from the common forms of cancer. These conclusions, however, are based on the study of fewer than 1,400 men, and in a group this size a very small risk would not have been easy to detect. Much larger numbers of persons are employed in industrial plants associated with the use of radiation sources of various kinds, and there can be no doubt that these numbers will increase considerably in the ensuing decades. These men are, on the whole, exposed to more energetic sources of radiation, and in some cases to types of radiations—for example, fast neutrons—for which the relative biological efficiency for the induction of delayed radiation effects may have a value greater than that of γ rays or medium voltage x rays. It is therefore necessary to be cautious in generalizing from the present experience.

The findings do, however, suggest that, so long as care is taken to introduce and observe the recommended measures of protection, the long-term somatic risks of radiation will be very small.

Summary and Conclusions

A study has been made of the causes of death of 1,377 male British radiologists during a 60-year period from 1897 to 1957.

A comparison of the observed and expected numbers of deaths from all causes provides no evidence that occupational exposure to ionizing radiations has caused a detectable non-specific shortening of the expectation of life. This is particularly striking, since the population includes most of the pioneer British radiologists, many of whom are known to have suffered from specific effects of over-exposure—that is, radiation dermatitis and skin cancer.

A significant excess of cancer deaths was found among those men entering the practice of radiology before 1921, the year in which the first committee to advise on protection was formed. The excess was confined to tumours of the skin and pancreas and (possibly) leukaemia.

No excess mortality from cancer was found in those men entering radiology subsequent to 1920; but it is as yet too early to be sure that the cancer hazard has been eliminated.

The suggestion that this survey should be undertaken was made by the External Radiation Subcommittee of the Medical Research Council's Committee on Protection against Ionizing Radiations, and we should like to record our indebtedness to the chairman, Dr. J. F. Loutit, and the other members of the subcommittee. We would like to thank the Council of the British Institute of Radiology and the Faculty of Radiologists for permission to make use of their records, and the members of their staffs for their ready assistance. We would like also to thank the General Medical Council, the British Medical Association, and the many persons who helped us to obtain information about the individual radiologists, and particularly Mrs. Tana Lloyd, Miss Flora Callaby, and Mrs. Marie Kidd, of the staff of the Medical Research Council, who collected the greatest part of the data.

REFERENCES

Blair, H. A. (1956). *Data Pertaining to Shortening of Life Span by Ionizing Radiation*. University of Rochester, U.R. 442.
Court Brown, W. M., and Doll, R. (1957). *Rep. med. Res. Coun. (Lond.)*, No. 295. H.M.S.O., London.
Dublin, L. I., and Spiegelman, M. (1948). *J. Amer. med. Ass.*, **137**, 1519.
Failla, G. (1957). *Radiology*, **69**, 23.
—— and McClement, P. (1957). *Amer. J. Roentgenol.*, **78**, 946.
Godfrey, B. E., Osborn, S. B., and Templeton, D. J. (1957). *Lancet*, **1**, 363.
Henshaw, P. S. (1957). *Radiology*, **69**, 30.
Hunter, D. (1955). *The Diseases of Occupations*. English Univ. Press, London.
Hursh, J. B. (1956). *The Effect of Ionizing Radiation on Longevity*. University of Rochester, U.R. 506.
Jones, H. B. (1957). *The Nature of Radioactive Fall-out and its Effects on Man*. U.S. Government Printing Office, Washington.
Jordan, C. W. (1952). *Life Contingencies*. Society of Actuaries, Chicago.
McKenzie, A., Case, R. A. M., and Pearson, J. T. (1957). *Studies on Medical and Population Subjects No. 13. Cancer Statistics for England and Wales, 1901-1955*. H.M.S.O., London.
March, H. C. (1950). *Amer. J. med. Sci.*, **220**, 282.
Mole, R. H. (1957). *Nature (Lond.)*, **180**, 456.
National Academy of Sciences: National Research Council (1956). *The Biological Effects of Atomic Radiation*. Washington.
Registrar-General for England and Wales (1923). Supplement to the Seventy-fifth Annual Report. Part IV. *Mortality of Men in Certain Occupations in the Three Years 1910, 1911, 1912*. H.M.S.O., London.
—— (1927). Decennial Supplement, 1921. Part II. *Occupational Mortality. Fertility and Infant Mortality*. H.M.S.O., London.
—— (1938). *Decennial Supplement*, 1931. Part IIa. *Occupational Mortality*. H.M.S.O., London.
—— (1958). *Decennial Supplement*, 1951. Part II. *Occupational Mortality*. H.M.S.O., London.
Seltser, R., and Sartwell, P. E. (1958). *J. Amer. med. Ass.*, **166**, 585.
Warren, S. (1956). Ibid., **162**, 464.

PRELIMINARY REPORT ON MASS VACCINATION OF MAN WITH LIVE ATTENUATED POLIOMYELITIS VIRUS IN THE BELGIAN CONGO AND RUANDA-URUNDI*

BY

G. COURTOIS, M.D.
Director, Laboratoire Médical, Stanleyville, Belgian Congo

A. FLACK, M.D.
Medical Director, Clinton Farms, Clinton, N.J., U.S.A.

G. A. JERVIS, M.D.
Director of Laboratories, Letchworth Village, New York State Department of Mental Health, Thiels, N.Y., U.S.A.

H. KOPROWSKI, M.D.
Director, the Wistar Institute, Philadelphia, Pa., U.S.A.; previously Assistant Director, Virus and Rickettsial Research Lederle Laboratories, Pearl River, N.Y., U.S.A.

AND

G. NINANE, M.D.
Laboratoire Médical, Stanleyville, Belgian Congo

Vaccination of man by oral administration of live attenuated poliomyelitis virus has been employed in clinical trials in the United States of America (Koprowski, 1955; Koprowski *et al.*, 1952, 1956a, 1956b). Several attenuated strains representing the three types of poliovirus were investigated, and the number of persons vaccinated in each trial was kept purposely small until a strain could be found which would satisfy laboratory and clinical criteria of safety. Such strains finally became available (Koprowski, 1957), and therefore it was decided to organize a clinical trial on a larger scale than had been previously attempted.

While participating in a rabies course organized by the World Health Organization in 1955 in Muguga, Kenya, one of the authors (H. K.) had the opportunity, through

*Part of the work mentioned in this paper was supported by a research grant (E-1799) from the National Institutes of Health, U.S. Public Health Service.

the kindness of Dr. T. J. Wiktor, Veterinary Service, Belgian Congo, to contact one of the other authors (G. C.) and to propose a programme of experiments for the evaluation of attenuated strains of poliovirus in chimpanzees. Following the successful outcome of preliminary negotiations, a chimpanzee colony was established in Lindi (Stanleyville, Belgian Congo) and experiments were initiated after necessary permission and financial support had been obtained from the Government of the Belgian Congo.

In the course of this work, results of which will be published elsewhere (Courtois *et al.*, 1958), caretakers of the animal colony were vaccinated with attenuated virus in order to protect them against possible exposure to the virulent poliomyelitis used for challenge of vaccinated chimpanzees. The successful outcome of the programme for immunization of the caretakers prompted us to undertake clinical trials in the Belgian Congo on a much larger scale than had been attempted so far. Authorization to conduct such trials was obtained in the second half of 1957 from Dr. Charles Dricot, Physician-in-Chief, Government of Belgian Congo, to whom we express gratitude.

Material and Methods

Virus Strains.—The Chat strain of type 1 poliovirus and the Fox III strain of type 3 poliovirus were chosen for vaccination purposes (Koprowski, 1957). The large pools representing each strain were prepared in the Laboratories of the Wistar Institute, Philadelphia, Pa., and tested for lack of virulence in rhesus monkeys injected intracerebrally and intraspinally and in chimpanzees injected intraspinally (the latter tests were done in Lindi Camp, Belgian Congo). None of the intracerebrally injected monkeys and intraspinally injected chimpanzees (five animals were injected with aliquots of undiluted material representing each pool) showed signs of illness, and histological examination of the central nervous system showed only one chimpanzee with mild lesions of the spinal cord suggestive of poliomyelitis infection (Fox III). Signs of polio infection were found in some of the rhesus monkeys injected intraspinally with the undiluted material; this, however, has not deterred us from using these strains for mass vaccination purposes, as there is no strain of attenuated poliovirus available anywhere in the world completely devoid of pathogenic properties when injected intraspinally into rhesus or cynomolgus monkeys (Sabin, 1957).

For additional testing, aliquots of each pool were injected into 20 rabbits, 14 infant mice, 5 guinea-pigs, and 12 adult mice in order to rule out the presence of other viral agents, such as B virus, lymphocytic choriomeningitis, and Coxsackie viruses. Although the material was filtered through bacteria-retaining filters, rigid tests for bacterial sterility were completed before the virus pools were used in man.

The efficiency of each virus preparation was finally checked by feeding the virus to a small group of infants and adults in the United States of America. These individuals had no antibodies against the type of virus administered, and in no instance was there a reaction of any kind. This procedure also made it possible to determine the minimum immunizing dose of the virus, which was found to be $10^{5.7}$ TCD_{50} (tissue culture doses) for non-immune children and adults and $10^{5.9}$ TCD_{50} for infants less than 1 month old.

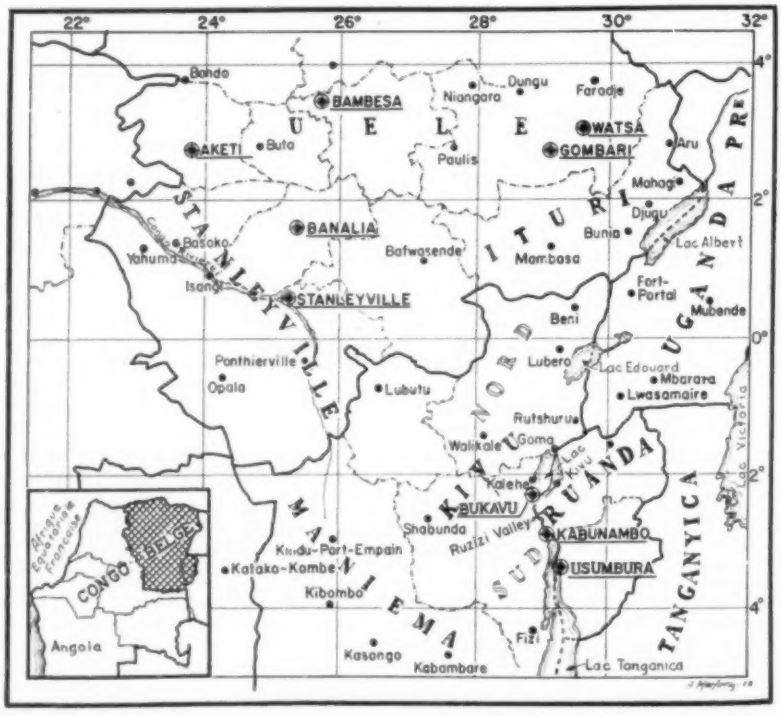
Method of Administration of Virus to Man.—The virus preparation was administered either in capsule (Koprowski *et al.*, 1956b) or in liquid form. Administration of the liquid was accomplished either by immersing an automatic pipette into a large container of virus preparation and squirting 1 ml. direct into the mouth of the recipient or by simply using a tablespoon. The approximate minimum dose fed to each individual was $10^{5.3}$ TCD_{50} of each strain. Throughout the above period the container of virus suspension was kept at 4° C.

Determination of Neutralizing Antibodies.—In localities where prophylactic vaccination was contemplated a certain number of individuals chosen at random were bled and the presence of neutralizing antibodies against all three types of poliovirus was determined by means of the immuno-inactivation test described by Gard (1957). Immunization of the total population of the community was decided upon only if 12% or more of the sera collected were found to have no antibodies against a given type of virus.

Since type 1 virus was incriminated in most outbreaks of paralytic poliomyelitis, including those in the Belgian Congo (see below), it was decided to give priority to vaccination with *attenuated* type 1 virus wherever it was statistically feasible.

Vaccination of Populations in the Absence of a Poliomyelitis Epidemic

Localities where trials took place are shown on the accompanying map of the Belgian Congo, and the total number of persons vaccinated is given in Table I.



Map showing locations in the Belgian Congo and Ruanda-Urundi (Aketi, Stanleyville, Ruzizi Valley, Banalia, Gombari, Watsa, and Bambesa) where mass vaccination trials with live attenuated poliovirus were conducted. The small insert map shows the same region (cross-hatched) in relation to the surrounding geographical area.

TABLE I.—*Number of Persons Vaccinated with Live Attenuated Poliovirus* in Various Communities in the Belgian Congo and Ruanda-Urundi*

Town	Adults		Children Under 15 Years	Total
	Males	Females		
Stanleyville	1,651	1,005	1,572	4,228
Aketi	—	—	1,978	1,978
Gombari	1,371	1,028	1,083	3,482
Watsa	3,136	4,753	4,900	12,789
Bambesa and Kule-Ponge ..	219	946	1,268	2,433
Ruzizi Valley	62,140	62,200	91,164	215,504
Banalia	1,267	1,343	1,572	4,182
Total ..	69,784	71,275	103,537	244,596

* Chat strain type 1 poliovirus. In addition, 2,511 persons were vaccinated with type 3 poliovirus, Fox III strain; 134 men, 130 women, and 2,247 children

Aketi.—Here 1,978 school-children, most of them between 5 and 15 years old, were chosen for vaccination. One hundred serum specimens obtained by random bleeding of future recipients of the vaccine were examined by means of neutralization tests; 15% were found to have no antibodies against type 1 and 43% no antibodies against type 3 virus. The Chat strain virus preparation was administered in capsules to 1,978 recipients (see Table I), and those who showed no antibodies against this type were bled again two months after vaccination. During that period rigid clinical observations failed to show any signs of illness which could be attributed to the vaccine. All but two of the vaccinated children who had no antibodies to type 1 virus before vaccination developed determinable serum antibodies against type 1 poliovirus following vaccination. Six months after vaccination with type 1 virus, the Fox III strain of type 3 virus was administered to the same population. Again no signs of illness were observed, and all but two who had no antibodies to type 3 virus before vaccination developed type 3 antibodies following vaccination.

Stanleyville.—During the 12 months preceding the mass trial at Ruzizi Valley (see below) infants, children, and adults of European and native origin living in Stanleyville were vaccinated with Chat and Fox III virus strains. A large group of school-children, mostly of European origin, were vaccinated with living virus every week during that period of time. The total number was 4,228 (see Table I), and careful clinical observations failed again to reveal any detrimental effects of the vaccines.

Ruzizi Valley.—A mass vaccination trial was decided upon after preliminary testing of 84 serum specimens collected at random from inhabitants of Ruzizi Valley revealed that 12% had no neutralizing antibodies against type 1 virus and 15% had no antibodies against type 3 virus. The trial began on February 24, 1958, and was completed by April 10. The native population were informed by their chiefs about the vaccination project and assembled daily at previously fixed rally points. From 3,000 to 11,000 persons were vaccinated daily by members of one or two vaccination teams. The vaccine used was a preparation of Chat type 1 poliovirus, given orally as a liquid. Included in the trial were two missionary schools whose pupils were divided into two groups, one receiving the vaccine and the other a placebo. Medical authorities were asked to report any occurrence of illness which could be attributed to vaccination, but none was reported. For evaluation purposes 450 blood specimens were obtained at random before vaccination from individuals who were less than 15 years old. The total number of children and adults vaccinated in the Ruzizi Valley was 215,504, as indicated in Table I.

Vaccination Against Poliomyelitis in Face of an Epidemic

Banalia.—Between the end of November, 1957, and the first days of January, 1958, eight cases of paralytic poliomyelitis in native infants and children less than 5 years old were observed in Banalia. Signs of paralysis in the latest two cases were observed five days before vaccination was started. The total population of Banalia was 4,182, and the number of children less than 5 years old was 674 (Table II). Since all cases of paralytic poliomyelitis occurred in children less than 5 years old, the actual incidence for that age group was 1.2%.

TABLE II.—*Age and Sex Distribution of Inhabitants of Banalia Vaccinated with Live Attenuated Poliovirus*

Age	Males	Females	Total
< 5 years	312	362	674
5–14	497	401	898
Adults (over 14 years)	1,267	1,343	2,610
Total ..	2,076	2,106	4,182

Following the recommendation of the Expert Committee on Poliomyelitis of the World Health Organization (Report of the Expert Committee, 1957) and upon the request of the Médecin Provincial of Province Oriental, Chat type 1 virus was administered to every inhabitant of Banalia. Blood specimens were obtained before vaccination, including samples from three of the persons who had contracted paralytic poliomyelitis most recently. Sera from these three patients were examined by means of a complement-fixation test for the presence of antibodies against antigens representing each of the three types of virus. No antibodies were discovered against type 2 and type 3 viruses, but sera in dilutions 1:16, 1:16, and 1:32 were found to fix complement in the presence of type 1 antigen; the outbreak would therefore seem to have been caused by type 1 virus. Not a single case of paralytic poliomyelitis was observed in Banalia following oral vaccination with the Chat type 1 strain of virus.

Gombari, Watsa, and Bambesa.—Within three weeks of the occurrence of the last paralytic case in Banalia, outbreaks of paralytic poliomyelitis were reported in Gombari, Watsa, and Bambesa. In Gombari, a village of 3,482 inhabitants, 12 cases of paralysis were reported. In Watsa, out of 12,789 inhabitants, two cases were observed. In Bambesa seven cases were noted among 2,350 inhabitants. Live attenuated Chat type 1 virus was administered within five days of the occurrence of the last reported case of paralysis. Again, as in Banalia, every inhabitant of Gombari, Watsa, and Bambesa received the vaccine. After the fourth post-vaccination day no new cases of paralysis were observed in these localities.

Summary and Conclusions

A total of 244,596 inhabitants of the Belgian Congo and Ruanda-Urundi of both sexes and all ages were vaccinated with live attenuated Chat strain type 1 poliovirus by the oral route. Of these, 2,511 also received the Fox III strain of attenuated type 3 virus. No sickness was reported following administration of the virus.

Figures based on a preliminary survey of neutralizing antibodies in the population who were later vaccinated indicated that 12% had no antibodies against the type 1 virus which was used as vaccine. More exact data on the proportion of polio-susceptible individuals will be obtained when laboratory tests on the large number of sera collected during the actual trial are completed.

Following recommendation of the Expert Committee on Poliomyelitis of the World Health Organization, the live Chat type 1 virus was administered during four epidemic outbreaks of paralytic poliomyelitis in the Belgian Congo. After vaccination no more cases of paralysis were reported in the four localities involved in the outbreaks.

We thank all the officials who gave us permission to carry out the mass vaccinations: Dr. Dricot, Physician-in-Chief, Government of the Belgian Congo; Dr. Gillet, Chief of the Hygiene Service at Bukavu, under whose control the Belgian Government has placed the experiments; Dr. Claessens, Dr. Gillart, and Dr. Van Daele, Provincial Physicians. We especially thank Mr. Brakel, who took part in the vaccination campaign during the epidemics. We likewise thank all those who contributed directly to the vaccination programme: Dr. Meyus, Dr. Dewolf, Dr.

Ledent, and their associates, Mr. Nanan, Mr. Lespagne, Mr. Caubergh, and Mr. Chappe; not to forget the territorial authorities who contributed to the success of the organization of our projects. Grateful acknowledgment is also made to Dr. K. Hummeler, Children's Hospital, Philadelphia, Pa., for his valuable help in the testing programme.

REFERENCES

Courtois, G., Koprowski, H., Ninane, G., Norton, T. W. and Osterrieth, P. (1958). Manuscript in preparation.
Gard, S. (1957). *Arch. ges. Virusforsch.*, **7**, 449.
Koprowski, H. (1955). *Wld Hlth Org. Monogr. Ser.*, **26**, 335.
—— (1957). In *Special Publications of the New York Academy of Sciences*, **5**, 128.
—— Jervis, G. A., and Norton, T. W. (1952). *Amer. J. Hyg.*, **55**, 108.
—— Norton, T. W., Hummeler, K., Stokes, J., jun., Hunt, A. D., jun., Flack, A., and Jervis, G. A. (1956a). *J. Amer. med. Ass.*, **162**, 1281.
—— —— Jervis, G. A., Nelson, T. L., Chadwick, D. L., Nelsen, D. J., and Meyer, K. F. (1956b). Ibid., **160**, 954.
Report of the Second Expert Committee on Poliomyelitis (1958). *Wld Hlth Org. techn. Rep. Ser.*, No. 145. In press.
Sabin, A. B. (1957). *J. Amer. med. Ass.*, **164**, 1216.

ANOREXIA NERVOSA: A SOMATIC DISORDER

BY

EIRIAN WILLIAMS, M.D., M.R.C.P.
Senior Medical Registrar, The London Hospital

The results of treatment in anorexia nervosa are poor and have not benefited from its inclusion with the psychosomatic disorders (Cobb, 1950). Indeed, the approach to treatment has recently become confused owing to the mystery which now surrounds its aetiology, at one time explained in terms which, if superficial, at least were easily understood.

In his original description of the disease Sir William Gull (1874) attributed the want of appetite to a "morbid mental state," claiming that its origin is "central and not peripheral," and that the state might be called "hysterical without committing ourselves to the etymological value of the word, or maintaining that the subjects of it have the common symptoms of hysteria." He described his patients as "wilful, often allowed to drift their own way into a state of extreme exhaustion," in this way clearly implying that the illness is largely self-induced. Samuel Gee (1907) described it as a melancholy—"no more than a high degree of the melancholy which affects so many girls about the age of puberty and for some years afterwards," arising, he said, "from a morbid excess of that craving for sympathy which is so common to all mankind, as is especially strong in the female sex." Ryle (1936), in his Schorstein Memorial Lecture, summarized the sequence of events in this way: "A psychic trauma or a foolish habit or some combination of the two results in a loss of appetite and a suppression of the menses. Starvation follows and with starvation an aggravation of the anorexia."

Ryle (1936) protested that "physicians subject to the lures of endocrinology have been tempted sometimes to find a basis for the symptoms of the disease in a primary deficiency or disharmony of the internal secretions." Psychiatrists, on the other hand, have claimed the illness in all its aspects as their own. History-taking has given way to psycho-analysis; physical findings are now ignored; and treatment has been ousted by therapy, either psychotherapy or electric convulsion, or both. Importance is attached to training in bowel habits at an unusually early age, to the relationship of "orality" to "sexuality" as in monkeys deprived of the uncus region of the brain (Sifneos, 1952), and even to the birth of Heitzi-eibib, a divine ancestor of the Hottentots, because a girl had swallowed the sap of grass (Waller *et al.*, 1940).

These observations may be significant. Even so, anorexia nervosa is primarily a wasting disease, and when death occurs, as it does in a proportion of cases, it is directly due to malnutrition. Renourishment should therefore be the first object of treatment, and the problem is to decide how it can best be achieved.

The Patients: Their Management and Progress

Forty-nine females with anorexia nervosa were admitted to the wards of the London Hospital between 1897 and 1953, and four others are included who were admitted later (see Table).

Eleven were admitted on more than one occasion and three had previously been in hospital elsewhere. Marked weight loss and amenorrhoea were present in all, and, although many underwent extensive investigations, none showed evidence of primary organic disease. Both of the men in whom the diagnosis was made are excluded from the investigation.

Treatment.—Few patients were confined to bed, and for the majority no special diets were prescribed. The records do not reveal how much individual attention was given to each patient at meal-times, nor to what extent persuasion and discipline were applied. Dr. Stephen Mackenzie in 1897, however, let it be known of his patient, who in three years had reduced in weight from 10 st. to 5 st. 8 lb. (63.5 to 35.4 kg.)—"if she objects to food it is to be forced by means of a stomach pump." This she managed to avoid, unlike seven others, admitted later, who were intubated.

Immediate Results.—One patient who was comatose on admission died the following day. The rest were in hospital for periods ranging from 7 to 130 days, only five remaining for less than two weeks. The average length of stay was 42 days.

Treatment Without Intubation

Of those patients not intubated seven alone gained more than 14 lb. (6.4 kg.) in weight while in hospital, and in only five of these did it return to near normal. Seven patients continued to lose weight, one of them (Case 12) developing pulmonary tuberculosis during admission. It might be argued that many of those who gained a few pounds during a brief stay in hospital would have continued to improve had they remained longer. Other patients who were in for a month or more, however, showed a similar optimistic weight gain in the early weeks, only to relapse later. In assessing the value of treatment without intubation there were 57 such admissions, excluding that of the patient who died, and it must be concluded that at least 46 of them were fruitless.

Treatment with Intubation

On the other hand, good immediate results were obtained in the seven patients who submitted to intubation. All gained weight, the average being 22 lb. (10 kg.) per patient; and the overall gain, in proportion to the time spent in hospital, would undoubtedly have been greater had they all been intubated early, instead of, as with some, after other methods had failed. Thus one patient (Case 14), in the first instance, was intubated for only 22 days, and, in her last admission, for only 31 days. Another (Case 20) was intubated on the 70th day of admission, and her stay could have been shortened accordingly. One patient (Case 53), on the other hand, began treatment on the third day and responded forthwith. She gained 41 lb. (18.6 kg.) in 28 days; her rapid progress is depicted in Fig. 1. All seven patients became stronger and happier as they gained weight, and the improvement in their mental outlook was as impressive as that in their bodily state. But this improvement was short-lived in one (Case 14) after her first admission, although in the end she recovered, and in another (Case 30) who eventually died (Fig. 2).

One patient (Case 52), it must be admitted, had already gained 17 lb. (7.7 kg.) in weight before being intubated, and was fed in this way for only seven days. The threat of re-intubation was undoubtedly of strong deterrent value in her case, however, thus contributing to her continued gain in weight.

Long-term Results

The four patients (Cases 50–53) admitted after 1953 have not as yet relapsed. All were treated with intubation. The two patients admitted in 1954 and 1955 are both well, and one of them (Case 51) has had a child. Another (Case 52) was admitted in March, 1957, and, while she has maintained her weight, is often away from school, due mainly to lack of parental discipline. The last patient in the series (Case 53) was discharged in November, 1957.

An attempt was made to trace the 49 patients admitted before and during 1953. This failed in seven of them, although one of these (Case 5) is known to have entered a psychiatric hospital in 1950, weighing 5 st. 12 lb. (37.2 kg.), four years after her admission to the London Hospital, and another (Case 13) was unimproved in 1945, nine years after her admission.

Deaths

Ten patients have died, including the one (Case 11) who died in hospital. Another (Case 16), who is recorded as untraced, may also have died, but information in her case is said by her mother to have died at home two years later, and another (Case 31), first admitted in 1939, died, according to her mother, in 1949, without improving meanwhile.

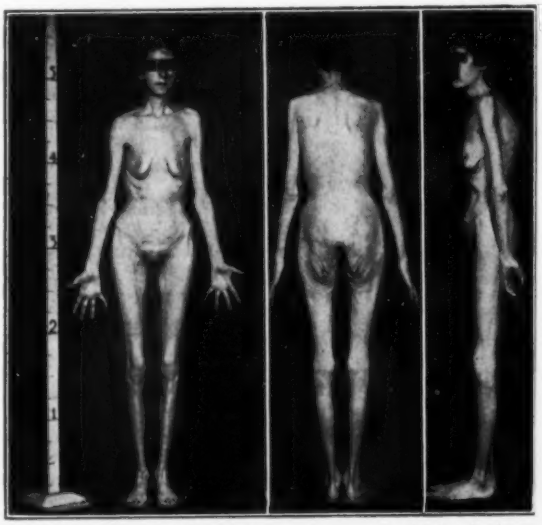
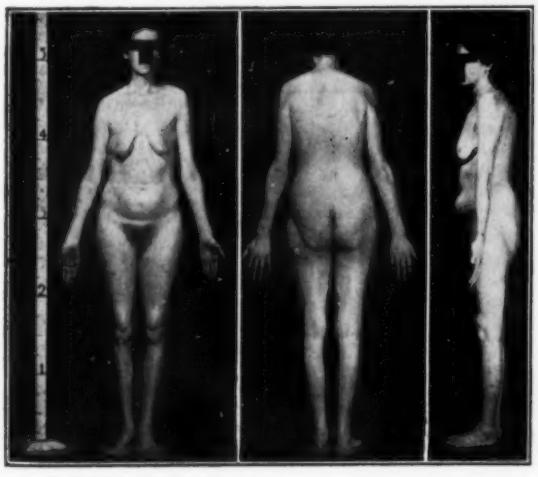


FIG. 1.—Case 53. Showing response to treatment with intubation. Above: August 26, 1957, weight 6 st. (38.1 kg.). Below: October 8, 1957, weight 8 st. 11 lb. (55.8 kg.).



Of another patient (Case 17), admitted in 1937, her family doctor writes: "I do not think she was actually psychotic. She was a walking skeleton for many years, and slipped into coma frequently. On March 2, 1953, she did this once too often and died. She was signed up as (i) hypoglycaemia, (ii) anorexia nervosa. Her weight at death could not have exceeded 5 st." (31.8 kg.).

Another patient (Case 23), admitted in 1933, "survived for only about a year after leaving hospital, dying of inanition without intercurrent infection." Yet another patient is inadequate. Two (Cases 12 and 41) died of pulmonary tuberculosis two months and nine months respectively after leaving hospital, and in neither was the initial diagnosis ever in doubt. Necropsy in Case 11 showed the body to be very much wasted. There were no other definite findings, although microscopical examination was not made.

The seven remaining patients died of inanition a few months to 17 years after admission, and anorexia nervosa persisted in all until death. One (Case 9), admitted in 1925,

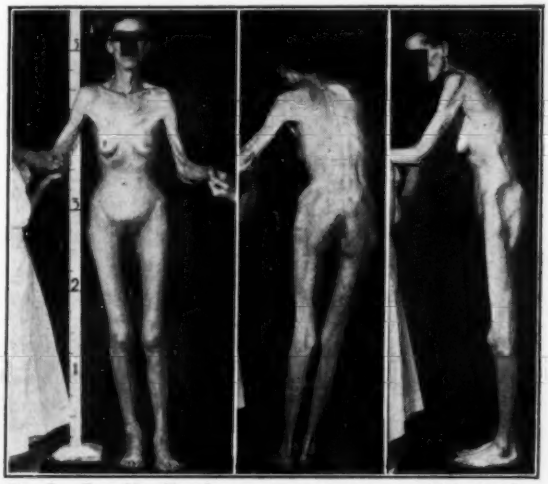
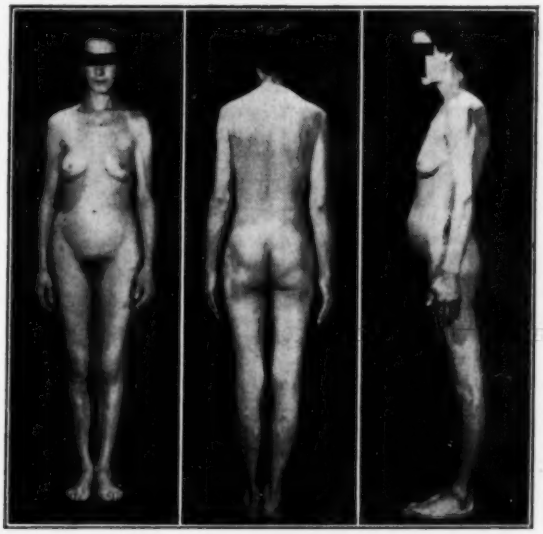


FIG. 2.—Case 30. Showing response to treatment with intubation. Above, January 19, 1953, weight 6 st. 1 lb. (38.6 kg.). Below, May 14, 1953, weight 7 st. 12 lb. (49.9 kg.). Patient was intubated on April 8, 1953, when her weight was 6 st. 11 lb. (43.1 kg.).



Progress of 53 Patients with Anorexia Nervosa in Hospital and Subsequently

Case No.	State	Age	Occupation	Highest Previous Weight			Duration of Weight Loss	Weight on Admission			Days in Hospital	Weight Gain in Hospital			Method of Review	No. of Years After Admission	Condition
				st.	lb.	kg.		st.	lb.	kg.			lb.	kg.			
1	S.	20	Secretary	8	8	54·4	3 yrs.	5	5	34·0	18		2	0·9	A	8	S. No improvement. Refused to be seen. Still not eating
2	S.	21	Teacher				2½ ,,	5	11	36·7	28	Loss	5	2·3	Q	14	S. Well. 9 st. 4 lb. (59 kg.). Attributes recovery to hard work. T.D.W. 11 years
3	S.	22	Shop asst.	7	0	44·5	3 ,,	4	9	29·5	34		7	3·2	Q	11	S. Well. 7 st. 8 lb. (48·1 kg.). Improved after leaving hospital. T.D.W. 3 years
4	S.	16	Clerk	8	5	53·1	1 yr.	4	9	29·5	29		3	1·4	I	13	S. 6 st. 4 lb. (39·9 kg.). Improved, but still nervous. Regular work as technician
5	S.	23	Telephonist	9	0	57·2	9 mths.	6	4	39·9	130		10	4·5			Untraced. 4 years later (1950) admitted to a psychiatric hospital weighing 5 st. 12 lb. (37·2 kg.). Discharged 7 st. 10 lb. (49 kg.)
6	S.	20	Clerk	7	7	47·6	4 yrs.	4	0	25·4	47		11	5·0	I	20	S. Well. 7 st. 7 lb. (47·6 kg.). Attributes recovery to her return to church life. T.D.W. 4–6 years
	S.	22						4	8	29·0	24		2	0·9			
7	S.	33	Typist				9 mths.	4	11	30·4	34		2	0·9	Q	21	M. Well. 6 st. 13 lb. (44 kg.). Daughter aged 16 years. Attributes recovery to " a complete reversal of mind. I must have had a lot of will-power to bring my weight down to 4 st. 8 lb." (29·0 kg.). T.D.W. 3–4 years
8	S.	13	Schoolgirl				18 ,,	4	10	29·9	39		9	4·1	I		Died in 1927, 2 years later, at home
9	S.	15	Nil				6 ,,	4	6	28·1	55	Loss	7	3·2			
10	S.	23	Secretary				18 ,,	7	3	45·8	10	Loss	2	0·9	Q	16	M. Well. 9 st. (57·2 kg.). 2 children. T.D.W. 3–4 years
	S.	23						6	13	44·0	48		6	2·7			
11	S.	30	?				12 yrs.	Extremely emaciated									Died the day after admission
12	S.	18	Typist				10 mths.	7	0	44·5	72	Loss	13	5·9			Died of pulmonary tuberculosis 2 months after discharge. Became febrile in 4th week of admission. Excluded from weight-gain analysis
13	S.	26	Clerk	9	0	57·2	7 yrs.	5	10	36·3	16		17	7·7			Traced to 9 years after admission (1945). Not improved
14	S.	19	Machinist	8	4	52·6	2 ,,	6	6	40·8	45 (22)		17*	7·7	I	6	M. Well. 9 st. 5 lb. (59·4 kg.). Continued to improve from last admission. Married for a year. Works regularly. Admits " I could get my own way but for that tube." T.D.W. 4 years
	S.	20						5	13	37·6	33		1	0·45			
	S.	20						5	13	37·6	21	Loss	1	0·45			
	S.	21						6	10	42·6	44 (31)		9*	4·1			
15	S.	21	Typist	10	0	63·5	3 ,,	6	1	38·6	21		14	6·4	I	11	S. 6 st. 6 lb. (40·8 kg.). Improved, but nervous. Works regularly
16	S.	22	?				5 mths.	7	8	48·1	12		1	0·45			Untraced. Admitted 1929. Neighbours think she died 20 years ago
17	M.	35	Housewife				6 yrs.	4	2	26·3	38		5	2·3			Died 16 years later, weighing not more than 5 st. (31·8 kg.)
18	S.	17	Typist				4 mths.	5	8	35·4	17	Loss	4	1·8	Q	16	M. Well. 11 st. 4 lb. (71·7 kg.). No children. Was sent first to a mental hospital ? schizophrenia. Subsequently developed pulmonary and renal tuberculosis
19	S.	16	,,	9	8	60·8	6 ,,	6	1	38·6	81		47	21·3	I	17	M. Well. 10 st. 4 lb. (65·3 kg.). 2 children Recovered in hospital
20	S.	17	Clerk	9	0	57·2	4 ,,	6	2	39·0	128 (42)		19*	8·6	I	5	S. Well. 8 st. 12 lb. (56·2 kg.). Continued to improve after admission
21	S.	19	Librarian	11	6	72·6	3 yrs.	6	2	39·0	35		5	2·3	I	7	M. Well. 10 st. 9 lb. (67·6 kg.). Frightened by influenzal bronchitis and began to eat. T.D.W. 6 years
	S.	20						5	11	36·7	28						
22	S.	12	Schoolgirl	7	0	44·5	1 yr.	5	0	31·8	38		2	0·9	Q	5	S. Now well nourished. Thinks people talk about her. Under observation in mental hospital
23	S.	21	Clerk	16	0	101·6	5 yrs.	3	9	23·1	25		6	2·7			Died a year later of inanition
24	S.	21	,,	9	6	59·9	2 ,,	5	10	36·3	19		2	0·9			Died a few months later of inanition
25	S.	21	Lab. technician	8	12	56·2	3 ,,	5	7	34·9	85		16	7·3	Q	9	S. Hysteria simulating diffuse lupus
26	S.	40	Nil				5 ,,	4	5	27·7	59		19	8·6			S. Died of inanition 17 years later without improving meanwhile
	S.	41						4	4	27·2	76		12	5·4			Untraced. Admitted 1912
27	S.	21	Housework				2 ,,	5	4	33·6	36		6	2·7			
28	S.	18	Nil				7 mths.	6	5	40·4	7		1	0·45	Q	15	M. Well. 8 st. (50·8 kg.). 3 children. T.D.W. 2–3 years
	S.	18						6	4	39·9	40		2	0·9			
29	S.	22	Tin sorter				2 yrs.	3	8	22·7	46		12	5·4	Q	13	S. Well. 7 st. 7 lb. (47·6 kg.).
	S.	24						3	9	23·1	11		2	0·9			
30	S.	25	Farm worker	9	7	60·3	5 ,,	6	0	38·1	122 (28)		27*	12·2			S. Died 4 years later. Weight 4 st. 11 lb. (30·4 kg.)
31	S.	26	Nil	7	5	46·7	5 ,,	4	3	26·8	47		13	5·9			S. Died 9 years later without improving meanwhile
	S.	27						4	5	27·7	26		6	2·7			
32	S.	15	Schoolgirl				2 ,,	5	10	36·3	24		16	7·3	Q	5	M. Well. 9 st. (57·2 kg.). Recently married. E.C.T. without benefit 1 year after admission. Leucotomy suggested but refused. T.D.W. 4 years
	S.	16						6	4	39·9	53	Loss	2	0·9			
33	S.	13	,,	8	0	50·8	3 mths.	6	4	39·9	26		10	4·5	Q	8	M. Well. 9 st. 2 lb. (58·1 kg.). Continued to improve after leaving hospital
34	S.	23	Housework				8 ,,	6	6	40·8	38		6	2·7	I	15	S. 7 st. 6 lb. (47·2 kg.). Neurotic, but works regularly as shop assistant
	S.	24						5	12	37·2	46		4	1·8			
35	S.	19	Draper's asst.				6 ,,	6	3	39·5	25		13	5·9	I	18	M. Well. 9 st. 3 lb. (58·5 kg.). 2 step-children. T.D.W. 2–3 years
36	S.	22	Shop asst.				5 yrs.	6	4	39·9	18		5	2·3	I	6	S. Well. 11 st. 13 lb. (75·8 kg.). Leucotomy elsewhere 3 years after admission when weight 5 st. 13 lb. (37·6 kg.). Immediate weight gain. T.D.W. 8 years
37	S.	29	Clerk				10 ,,	6	13	44·0	24		10	4·5			Untraced. Admitted 1936
38	S.	36	,,	12	0	76·2	14 ,,	5	13	37·6	70		22	10·0	I	5	S. 6 st. 3 lb. (39·5 kg.). Undernourished. Symptom-free. Catamenia regular. Works regularly
39	S.	20	Shop asst.				1 yr.	5	6	34·5	33		2	0·9	I	6	S. Well. 7 st. 1 lb. (44·9 kg.). Anxious and easily tired. T.D.W. 6 years
40	S.	36	Governess				5 yrs.	4	13	31·3	8				Q	24	Relatives refused to disclose information; therefore presumed not tohave recovered
41		22	Housework				4 mths.	5	4	33·6	48		14	6·4			Died 9 months later of pulmonary tuberculosis
42	S.	20		9	6	59·9	3 yrs.	5	7	34·9	51		11	5·0	Q	20	S. Well. 11 st. (69·9 kg.). Recovered after going to Malaya with married sister
43	S.	14	Stock-room asst.				3 mths.	6	0	38·1	23		12	5·4	I	8	S. Well. 8 st. 11 lb. (55·8 kg.). T.D.W. 1 year

* = Patients treated with intubation. T.D.W. = Total duration of weight loss. A = Almoner's visit. I = Interview. Q = Questionary. The numbers in brackets represent number of days intubated.

Progress of 53 Patients with Anorexia Nervosa in Hospital and Subsequently—(continued)

Case No.	State	Age	Occupation	Highest Previous Weight		Duration of Weight Loss	Weight on Admission		Days in Hospital	Weight Gain in Hospital		Method of Review	No. of Years After Admission	Condition
				st. lb.	kg.		st. lb.	kg.		lb.	kg.			
44	S.	24	Clerk	8 3	52·2	1 yr.	6 6	40·8	49	28	12·7	Q	10	M. Well. 8 st. (50·8 kg.). 1 child. T.D.W. 3 years
45	S.	27	Artist's model			1 ,,	6 7	41·3	81	9	4·1			Untraced. Admitted 1934
46	S.	19	Domestic servant	11 0	69·9	10 mths.	5 9	35·8	19	2	0·9	I	21	M. Well. 8 st. 3 lb. (52·2 kg.). 4 children. T.D.W. 4–5 years
47	S.	21	Clerk	7 10	49·0	15 ,,	5 3	33·1	28	4	1·8	Q	20	S. Well, but thin. Works regularly
	S.	24					4 11	30·4	15	4	1·8			
48	S.	19	Housework	10 0	63·5	3 yrs.	5 8	35·4	50	13	5·9			Untraced. Admitted 1897
49	S.		Teacher	7 3	45·8	3 ,,	4 12	30·8	52	4	1·8	Q	21	S. Well. T.D.W. 8 years
50	S.	20	Typist	9 2	58·1	2 ,,	6 10	42·6	68 (53)	18*	8·2	I	2	S. Well. 8 st. 10 lb. (55·3 kg.)
51	M.	25	Housewife			15 mths.	5 11	36·7	39 (35)	25*	11·3	Q	3	M. Well. 7 st. 13 lb. (50·3 kg.). Pregnant. Continued to gain from admission. 1 child aged 2 years
52	S.	15	Schoolgirl	6 8	41·7	8 ,,	5 5	34·0	47 (7)	23*	10·4	I	Mths. 9	S. Well. 8 st. 8 lb. (54·4 kg.). Defaults school
53	S.	31	Unemployed	11 0	69·9	3 yrs.	5 11	36·7	48 (28)	42*	19·1			Recent admission. 9 st. 12 lb. (62·6 kg.) after 4 weeks' convalescence

* = Patients treated with intubation. T.D.W. = Total duration of weight loss. A = Almoner's visit. I = Interview. Q = Questionary. The numbers in brackets represent number of days intubated.

(Case 24), admitted in 1943, was, according to her doctor, "of sufficient nuisance value for me to remember her. After leaving hospital she went downhill and died at home a few months later. She simply died of inanition, and there was no question of secondary infection."

One patient (Case 26), admitted in 1938, was still alive in 1953. Then her doctor wrote, "She is at present grossly emaciated, with severe chilblains of both hands and feet." She herself replied that she was fairly well, but that she dreaded the winters because of her chilblains. On January 28, 1954, she was admitted to hospital, having been found unconscious on the floor by her sister. She died within eight hours, and at necropsy death was attributed to myocardial degeneration. No other abnormality was found apart from extreme wasting of all tissues.

One patient (Case 30), who was intubated during her admission in 1953, died four years later. Her weight gradually fell to 4 st. 11 lb. (30.4 kg.) three weeks before she died, and she was finally admitted to hospital elsewhere in coma, with a blood-sugar level of 34 mg. per 100 ml. There had been at least two previous episodes of hypoglycaemic coma. Necropsy was not performed.

Follow-up of Surviving Patients

Of the 49 patients admitted up to 1953, 32 remain, and 15 of them have attended for interview and examination. Eleven others, mostly living out of London, have replied to questionaries, and further information about them has been obtained when possible from their doctors. The relatives of one patient (Case 40) wished not to disclose her subsequent progress; one (Case 1) refused to be seen by an almoner who visited her home. Of the remaining four (Cases 22, 25, 32, and 42) adequate information has been obtained from their relatives and doctors and from other hospitals.

Twenty-three patients have recovered completely, the period of follow-up ranging from 3 to 21 years, with an average of 13 years. All are well nourished, happy, and fully employed; 12 have married and 6 of these have borne children. One patient (Case 36) was cured by leucotomy, performed elsewhere.

Six other patients reviewed 5 to 13 years after admission (average nine years) have improved. Thus five are at regular work, but are still underweight, with neurotic symptoms. These are unlikely to improve further, whereas one (Case 22), still only 17 years of age, has recently regained her normal weight, and may eventually also recover her normal mental outlook.

Three patients, on the other hand, have not improved. One (Case 1) is still poorly nourished and confined indoors, another (Case 25) is a gross hysteric, and another (Case 40), presumed from the attitude taken by her relatives not to have recovered, may have died.

Summary of Progress.—Thus out of a series of 53 patients with anorexia nervosa 10 have died, 3 have not improved, 6 have improved, and 23 have recovered. Seven are unaccounted for. The four admitted since 1953 have not as yet relapsed. These are among the seven treated with intubation; two others admitted earlier who were intubated are in the recovered group, and one who was not kept under surveillance has died.

Comment

The outcome in this as in most other reported series was largely unaffected by hospital treatment. Those patients who recovered did so of their own volition and in the fullness of time, mostly after their environment had deliberately or accidentally been changed. Only a few when questioned in retrospect could give a precise reason for recovery, and in these it was often as whimsical as the circumstance which had first precipitated the illness.

Thus one patient had been grossly underweight for six years until she developed bronchitis. It then occurred to her that if she did not eat she would die, whereupon her appetite returned and she recovered. Another, in the beginning, had tried repeatedly to diet, but had been defeated by hunger. At the age of 18 years she lost her appetite during an attack of influenza; she then succeeded in suppressing it further until her weight fell from 11 st. to 5 st. 9 lb. (69.9 to 35.8 kg.), and it remained at this level despite hospital treatment followed by four months at a convalescent home. Her eventual recovery she attributes to leaving home for domestic service; and now, at the age of 39, she frankly admits that the whole illness "was due to my own silliness in trying to starve myself."

It should not be inferred, however, that anorexia nervosa is best left to its own devices, for the mortality rate alone demands a most vigorous approach to treatment. Of the 53 patients under review, 10 died, and, although this is the highest death rate so far recorded, it has also been substantial in many other published series. The lowest weight recorded in the present series, 3 st. 8 lb. (22.7 kg.), was in a patient who recovered completely. Even so, the most emaciated patients are in greatest immediate danger, especially if their deterioration has been rapid (Emanuel, 1957).

Treatment by Psychiatric Methods

Psychiatrists almost without exception consider psychotherapy the appropriate treatment. Thus Du Bois (1949) claimed, "It is the neurosis and not the appetite that must be the prime focus of attack by the physician. Therefore psychotherapy is the major remedial agent. Little reference should be made to diet, and the family and nursing personnel are instructed to avoid talking about food or the patient's dietary habits. During the early weeks of treat-

ment psychotherapy consists of reassurance and explanation . . . and at the end of approximately three weeks it proceeds gradually to a deeper level." Yet of his 10 patients none was cured. Five remained thin and unhappy, two defaulted, and three were still under treatment. Similarly in Nemiah's (1950) series, although one patient gained 10 lb. (4.5 kg.) while in hospital, and another 20 lb. (9 kg.), there was no response from the remaining 12. Rahman *et al.* (1939) were forced to conclude, after treating 12 patients in this way, that much time and patience was required, and that the under-cover hostility met with made it difficult or impossible to establish a satisfactory therapeutic rapport.

Waller *et al.* (1940) have claimed a specific psychopathology for the illness, based on fantasies of oral impregnation which both their patients had experienced. Yet even psychiatrists are now sceptical of Waller's Freudian hypotheses (Kay, 1953), and are discouraged by the results of treatment based upon them. Kay and Leigh (1954) believe that psychotherapy is not the treatment of choice unless (1) there is no urgency, (2) a good relationship can be quickly established, and (3) the patient is able to formulate a complaint which could be used as a basis for therapy.

Whereas recent views on treatment have largely ignored its "somatic" aspect, it cannot be overemphasized that the danger to life is entirely from malnutrition or its consequences, and that the patient who succumbs does so only from starvation. But in endeavouring to reclaim anorexia nervosa it must first be established why it has strayed from the realm of somatic medicine to the borderlands of psychiatry (Cobb, 1943). The discouraging results of treatment based on general medical principles is one of the more obvious causes of its defection. Yet probably the most important is its tendency sometimes to simulate the psychoses, particularly schizophrenia, thus suggesting to physicians that it is a disease outside their competence to treat.

Neurotic symptoms and depression are common (Kay, 1953) and easy to understand. They may, in fact, be the direct outcome of inanition (Schiele and Brozek, 1948). Peculiarities of behaviour or "the perverse conceits and strange notions" described by Gee (1907), on the other hand, are more disconcerting. "One of these girls," he observed, "when she was alone in the drawing-room, was overheard to tell her parrot that she was not much longer for this world. Lost in her museful mopings, she takes delight in nothing and loves to be alone, though solitude does her more harm. . . . Sometimes she will think that exercise is very necessary and will take long walks far beyond her strength, or she will try the eccoprotic powers of leaping and dancing in her bedroom before daybreak until the awakened household protest against the continuance of such preposterous therapeutics." Despite this and similar instances, Kay and Leigh (1954) have reassuringly concluded that schizophrenia and anorexia nervosa are in no way allied. Furthermore, none of the patients in the present series has developed schizophrenia or any other psychosis requiring prolonged institutional care.

Hurst's Method of Treatment

The best results of treatment have been claimed by Ryle (1936), Ross (1936), and Hurst (1939), based on almost identical principles. These principles were most clearly enunciated by Hurst, who said that with explanation, firmness, and good temper the most resistant patient could be persuaded to consume a full meal, her progress thereafter being uninterrupted. Hurst, however, gave no details of the results he obtained, and Ryle, while stating that in the majority of well-handled cases recovery is complete, did not deal specifically with the immediate outcome. Many of his cases were in fact mild. Thus in 11 of his 46 female patients, who did not have amenorrhoea, the criteria for diagnosis were not fulfilled; and having traced 37 patients, 17 of the 21 who had recovered had not required institutional treatment. All 19 of Ross's patients, on the other hand, increased weight by at least 14 lb. (6.4 kg.) during admission.

But the ineffectiveness of Hurst's method in the hands of others and the difficulties entailed have never been adequately stressed. It was doubtless employed in many of the patients in the present series with results which were almost wholly discouraging.

Treatment with Intubation

All seven patients who were intubated gained weight, an average of 22 lb. (10 kg.) per patient, and their condition on discharge from hospital was good. Forty-four patients, on the other hand, not treated in this way gained an average of only 9 lb. (4.1 kg.) per patient, only seven gaining more than 14 lb. (6.4 kg.). Berkman *et al.* (1947) cautioned against intubation on the premise that the aggressive treatment of patients who are extremely emaciated might prove disastrous, and it has been used only inconsistently and in extreme cases by others (Rahman *et al.*, 1939; McCullagh and Tupper, 1940; Farquharson, 1941).

The method, however, has obvious advantages. Because little active co-operation is sought the initial resistance is never as great as to normal feeding, and at this stage the more enfeebled the patient the easier it is in any case to overcome (Lasègue, 1873). Furthermore, the protracted ordeal of each meal is avoided, and because calorie intake can readily be made to exceed requirements the rate of recovery is always maximal. The patient should still be encouraged to eat at meal-times despite the postprandial discomfort and superadded anorexia of prolonged starvation (Fenwick, 1880; Carlson, 1916). Meanwhile as weight inevitably increases so may depression and other nervous symptoms disappear (Schiele and Brozek, 1948; Keys *et al.*, 1950).

One patient in the present series, who was successfully intubated, died four years later, thus emphasizing the need for close liaison with the family doctor and all others concerned in the patient's care. In this way intubation may have to be employed repeatedly on patients who will eventually recover, but meanwhile the more recalcitrant are saved from dying of inanition.

Treatment with Leucotomy

A few patients resist medical treatment in any form. They constitute Ryle's (1936) psychotic group with inadequate personalities, but who at first are indistinguishable from their fellows. Anorexia in these, if they survive, persists indefinitely, and their treatment presents the greatest problem. In some the response to leucotomy has been excellent (Sargant, 1951; Sifneos, 1952; Mallinson, 1953; Sands, 1953), although Carmody and Vibber (1952) stressed that it should be considered only in refractory cases and in those who are frankly psychotic or of the obsessive compulsive group. Two patients in the present series recovered spontaneously after having been refractory for 8 and 11 years, and the selection of cases needing leucotomy is therefore still difficult.

Summary

The progress of 53 patients with anorexia nervosa has been studied, during and after their stay in a general hospital.

In-patient treatment was ineffective except in those who were intubated. Follow-up shows that 10 patients have died, 8 of them solely of malnutrition, others of the same severity recovering spontaneously after a varying number of years. Twenty-three patients have recovered completely.

The importance of the nutritional aspect of treatment should be stressed, and, whereas leucotomy may rarely be required, specialized psychotherapy is not indicated.

I am grateful to the physicians of the London Hospital for permission to study and publish their cases, and I am particularly

indebted to Dr. Donald Hunter and Dr. Kenneth Perry for their advice and criticism. I also thank Mrs. E. Scott, chief dietitian to the hospital, for her help, as well as the many general practitioners who co-operated in this investigation.

REFERENCES

Berkman, J. M., Weir, J. F., and Kepler, E. J. (1947). *Gastroenterology*, **9**, 357.
Carlson, A. J. (1916). *The Control of Hunger in Health and Disease*. University Press, Chicago.
Carmody, J. T. B., and Vibber, F. L. (1952). *Ann. intern. Med.*, **36**, 647.
Cobb, S. (1943). *Borderlands of Psychiatry*. Harvard Univ. Press.
—— (1950). *Emotions and Clinical Medicine*. Norton, New York.
Du Bois, F. S. (1949). *Amer. J. Psychiat.*, **106**, 107.
Emanuel, R. W. (1957). *Postgrad. med. J.*, **33**, 73.
Farquharson, R. F. (1941). *Illinois med. J.*, **80**, 193.
Fenwick, S. (1880). *On Atrophy of the Stomach and on the Nervous Affections of the Digestive Organs*. Churchill, London.
Gee, S. (1907). *Medical Lectures and Aphorisms*. Oxford Medical Publications, London.
Gull, W. W. (1874). *Trans. clin. Soc. Lond.*, **7**, 22.
Hurst, A. (1939). *Proc. roy. Soc. Med.*, **32**, 744.
Kay, D. W. K. (1953). Ibid., **46**, 669.
—— and Leigh, D. (1954). *J. ment. Sci.*, **100**, 411.
Keys, A., Brozek, J., Henschel, A., Mickelson, O., and Taylor, H. L. (1950). *The Biology of Human Starvation*. Univ. Minnesota Press, Minneapolis.
Lasègue, C. (1873). *Arch. gén. Méd.*, **21**, 387.
McCullagh, E. P., and Tupper, W. R. (1940). *Ann. intern. Med.*, **14**, 817.
Mallinson, P. (1953). *Proc. roy. Soc. Med.*, **46**, 674.
Nemiah, J. C. (1950). *Medicine (Baltimore)*, **29**, 225.
Rahman, L., Richardson, H. B., and Ripley, H. S. (1939). *Psychosom. Med.*, **1**, 335.
Ross, T. A. (1936). *An Enquiry into Prognosis in the Neuroses*. Cambridge Univ. Press.
Ryle, J. A. (1936). *Lancet*, **2**, 893.
Sands, D. E. (1953). *Proc. roy. Soc. Med.*, **46**, 674.
Sargant, W. (1951). *Lancet*, **2**, 87.
Schiele, B. C., and Brozek, J. (1948). *Psychosom. Med.*, **10**, 31.
Sifneos, P. E. (1952). *Amer. J. Psychiat.*, **109**, 356.
Waller, J. V., Kaufman, M. R., and Deutsch, F. (1940). *Psychosom. Med.*, **2**, 3.

TWO CASES OF COW'S-MILK ALLERGY

BY

B. D. BOWER, M.D., M.R.C.P., D.C.H.
Lecturer

D. G. STANLEY-ROOSE, M.B., B.S.
Formerly Resident Medical Officer

AND

O. H. WOLFF, M.D., M.R.C.P., D.C.H.
Senior Lecturer

From the Children's Hospital, Birmingham, and the Department of Paediatrics and Child Health, University of Birmingham

Acute allergic reactions to cow's milk in infancy are uncommon enough to justify a description of two cases that presented problems in diagnosis and management. In particular, the occurrence of ascites in one case deserves mention as a sign not previously reported.

Case 1

The patient, a female infant, was delivered by caesarean section after a 38-weeks' pregnancy. She was the first child of healthy parents and there was no family history of allergy. The neonatal period was uneventful. She was fully breast-fed until 3 weeks of age, when she was given a bottle feed of dried milk (" ostermilk No. 2 "). Immediately after this feed she vomited, and the next day developed diarrhoea with much mucus but no blood in the stools. Rapid deterioration with fever, intense irritability, and further vomiting led to her admission to the Children's Hospital, Birmingham, on July 26, 1956, within 48 hours of the first feed of cow's milk.

On admission she was shocked with peripheral cyanosis, a fever of 103° F. (39.4° C.), pulse rate of 160, and respiration rate of 50. Her cry suggested pain. The abdomen was distended and tympanitic, but no other signs were found.

Investigations.—Cerebrospinal fluid, normal. *X*-ray examination (Dr. R. Astley) of chest, normal; of abdomen: " The small and large intestines are fairly full of gas, with a few small fluid levels. In addition there is some diffuse opacity, and the abdominal distension is not entirely due to intestinal gas. Consistent with peritonitis." Paracentesis abdominis: clear straw-coloured fluid obtained without difficulty; microscopy showed some red cells, a few endothelial cells, and lymphocytes; no organisms were seen or cultured. Blood count: haemoglobin, 100% (14.8 g. per 100 ml.); W.B.C., 6,600 per c.mm. (metamyelocytes 1%, myelocytes 3%, polymorphonuclears 35%, eosinophils 1%, lymphocytes 54%, monocytes 6%). Urine, normal. Blood urea, 19 mg. per 100 ml. Stool: many fat globules, no pathogens isolated. Blood culture: *Staphylococcus albus* (contaminant).

Before paracentesis a diagnosis of primary peritonitis had seemed likely, but the nature of the ascitic fluid ruled this out. In the absence of a diagnosis the patient, who presented the picture of an overwhelming infection with intense toxaemia, was treated with oxygen, subcutaneous fluids, penicillin, and streptomycin. Her condition improved quickly and within a few hours of admission she tolerated oral feeds of 5% dextrose in 0.18% saline. The following day the fever had settled and she had gained 11 oz. (340 g.), but was still passing loose green motions with much mucus. The improvement continued and on the second day after admission quarter-strength feeds of dried milk (half-cream national dried milk) were started. Within a few hours she became ill once more; bile-stained vomits and frequent watery stools led to a weight loss of 6 oz. (170 g.). The pyrexia recurred, the abdominal distension increased, and a fine erythema appeared on the trunk and face. At this point the diagnosis of cow's milk allergy was first suggested. Consequently streptomycin and penicillin were discontinued and the feed was changed to expressed breast milk. The resulting improvement was dramatic; the fever settled, vomiting ceased, the motions became normal, abdominal distension subsided, and she started to gain weight.

Tests were undertaken to confirm the diagnosis of cow's milk allergy and, if possible, find a substitute for cow's milk: (1) *Scratch tests* on Infant:* breast milk, negative; half-cream national dried milk, positive; evaporated milk, positive; goat's milk, positive; " soyolk " (soya-bean milk), negative; " nutramigen " (a synthetic food in which amino-acids and simple peptides have been obtained by enzymic hydrolysis of casein), negative; " allergilac " (dried milk from which most of the lactalbumin has been removed and acid added), negative. (2) *Passive transfer test* (Prausnitz–Küstner reaction):* Serum taken from the infant was injected intradermally into the mother's forearm; 24 hours later a drop of milk to be tested was placed on the skin areas thus treated and a scratch made through each drop. Control tests were carried out in untreated areas on the opposite forearm:

	" Treated " Areas	Control Areas
Breast milk	Negative	Negative
Half-cream national dried	Positive	"
Evaporated milk	"	"
Soyolk	"	"

These tests confirmed the diagnosis of cow's milk allergy, but, as will be seen, were of no help in choosing a substitute.

During the next three weeks she was fed on expressed breast milk and gained over a pound (450 g.) in weight; the stools remained normal and she did not vomit. Four weeks after admission she was given a 6-oz. (170-ml.) feed of breast milk containing approximately 0.5 g. of soyolk powder. Within an hour of the feed she vomited copiously. The following day a similar feed had the same effect. The next day she tolerated a feed containing nutramigen in the

* " Positive " signifies appearance within 10 minutes of a weal and surrounding area of erythema greater than 2 cm. in diameter. " Negative " signifies absence of weal and little or no erythema. (Separation of test results into these two categories presented no difficulty.)

same dilution; during the ensuing five days the amount of nutramigen was gradually increased, but when the concentration reached eight times the original one vomiting recurred. On returning to pure breast-milk feeds vomiting ceased. Our third, and successful, choice was allergilac, which was added to breast milk at first in a dilution of 1 fl. dr. (3.5 ml.) of full-strength milk to 6 oz. (170 ml.) of breast milk; during the next nine days the amount of allergilac was increased up to full strength. She made uneventful progress and was discharged at the age of 10 weeks in excellent condition, but with a small patch of eczema on the forehead.

When she was four months old one drop of boiled cow's milk was added to each allergilac feed without ill effect, and thereafter the quantity was slowly increased, until two months later she was on full-strength cow's milk. No vomiting occurred during this period. Solids were then introduced, and she tolerated a normal toddler's diet, including cereals, eggs, meat, fish, etc. At 6 months the scratch test with cow's milk was negative and the passive transfer test gave only a slightly positive reaction.

Further progress has been uneventful, though the small patch of eczema on the forehead persisted to the age of 7 months.

Case 2

The patient, the fourth child in the family, was born normally at term. Birth weight, 8 lb. (3,630 g.). During the pregnancy, which had been complicated by excessive vomiting, the mother took between 1 and 2 pints (570 and 1,140 ml.) of milk daily. The three siblings were healthy, but the mother had always had eczema of the hands, and a paternal uncle suffered from asthma.

During the first few days of life two complementary feeds of cow's milk were given. A rash with "blisters" appeared on the buttocks at this time and took some weeks to fade. From the end of the first week until the age of 4½ months she was entirely breast-fed and thrived. Introduction of cow's milk was then tried, but each attempt led to pronounced resistance, the baby spitting out the milk vigorously; "blisters" appeared wherever milk touched the skin, and an erythematous rash occurred on face, neck, and trunk. Boiled cow's milk, three different popular dried milks and allergilac produced the same result whether given by bottle, cup, or spoon. Though there was no vomiting, she lost weight during out-patient observation. At the age of 6 months the mother's milk was failing and the infant had to be admitted to hospital to find a substitute for breast milk or, if the search proved unsuccessful, to desensitize her to cow's milk.

On admission she was contented and not obviously wasted, though her weight was only 12 lb. 8 oz. (5,585 g.). The following sensitivity tests were carried out: (1) *Scratch Tests on infant:* Breast milk, negative; cow's milk, positive; half-cream national dried milk, positive; full-cream national dried milk, positive; allergilac, positive; goat's milk, positive; soyolk, negative. (2) *Prausnitz–Küstner reaction* (intradermal injection of patient's serum into her father's forearm and scratch testing 24 hours later): No reaction to half-cream national dried milk, full-cream national dried milk, unmodified cow's milk, allergilac, soyolk, breast milk.

Soyolk therefore seemed suitable for trial. For three days this feed was given with no ill effect, although her resistance to feeding by bottle, cup, or spoon was such that it had to be given by intragastric tube. Then vomiting started and, far from being relieved by chlorpromazine, was apparently aggravated by it. Consequently, after a short period of dextrose feeding, a slow intragastric drip of breast milk was started, and vomiting ceased. At this point a barium-meal *x*-ray examination showed no anatomical abnormality of the oesophagus, stomach, or duodenum, but the stomach emptied slowly.

Three weeks after admission we tried goat's milk, despite the positive skin test, as an adequate supply of breast milk could not be guaranteed. A feed of 1 fl. oz. (28 ml.) of goat's milk and 5½ fl. oz. (156 ml.) of expressed breast milk was given, but was immediately vomited. For the next 10 days her feed consisted of breast milk alone, with two notable exceptions: one feed contained a small amount of soyolk and the other consisted of a full-strength dried milk feed given in error. These two feeds were the only ones to cause vomiting. As all these feeds were given by intragastric tube, it seems unlikely that a different taste or smell was responsible for the vomiting.

A desensitization course of cow's milk was started at the end of the fifth hospital week, when she was 7½ months old. A feed containing one drop of cow's milk in 8 oz. (230 ml.) of breast milk was given without incident, but when on the following day two drops were added to the feed she vomited. On this, as on the five subsequent occasions when an increase led to vomiting, no further increase was made for two or three days. After five weeks she was tolerating full-strength cow's milk.

When, during the period of desensitization, occasional feeds were offered by bottle or spoon she still refused them; and after desensitization it took five weeks of patient persistence on the part of the nursing staff before she accepted feeds from cup or spoon. Chlorpromazine was given for part of the time and seemed to help. Mixed feeding was then introduced without difficulty.

At 10 months she was discharged home, where good progress continued. Her mother had no difficulty in feeding her with solids, but at 16 months she still resented milk if it was not disguised.

Incidence

In British paediatric practice cow's-milk allergy is regarded as uncommon and in many of our standard textbooks is not mentioned, but Sheldon (1951) and Holzel (1955) give full descriptions. In other countries estimates of its incidence vary widely. Vest (1953) discovered only nine cases among 1,500 infants seen in a 25-year period (incidence 0.06%), and Collins-Williams (1956) found an incidence of only 0.3% in 3,000 infants and children. On the other hand, De Toni and Mitolo (1955), basing their opinion on the finding of positive intracutaneous skin tests in 14% of 132 healthy infants, regard cow's milk allergy as a very common condition during the first months of life, and stress its importance in the causation of many allergic conditions. Similarly, Clein (1951) found the high incidence of 1 in 15 infants (6.7%), but he attributes to cow's milk allergy such common symptoms as colic, "always chesty and snuffly," or "very unhappy all the time."

Loveless (1950) obtained information from a poll of specialists in allergy and paediatrics and estimated the incidence to be 1.5%. In our experience the condition is rare. One of us (O. H. W.) has seen approximately 2,000 infants and children during the period in which these two cases came under our care. All would agree that severe anaphylactoid reactions, such as were described by Cumming (1928) and Ashby (1929), are rare. In 1955 Collins-Williams reported another such case and stated that it was the 30th case of acute allergic shock due to milk in the English literature. In the milder reactions the diagnosis must often remain in doubt, at least to the sceptical observer.

Symptoms and Signs

Onset of Symptoms.—Symptoms may occur, as in our first case, immediately after the first feed of cow's milk. Vest (1953) suggested that placental transfer of antigen may then be responsible for sensitization. Collins-Williams (1955) stressed that a high milk intake during the pregnancy may be dangerous, but Clein (1951) could find no connexion between maternal milk intake during the pregnancy and subsequent development of allergy in the infant. More commonly the first symptoms occur one to five weeks after starting cow's milk or when cow's milk is reintroduced after a period of breast-milk feeding. Symptoms usually appear during the first four months except when introduc-

tion of cow's milk has been delayed until the second six months, as it was in Cumming's (1928) and Ashby's (1929) cases.

Typical symptoms are acute shock with peripheral failure, wheezing, vomiting, diarrhoea, abdominal distension, fever, and the appearance of a rash where milk touches the skin. Ashby (1929) and Rubin (1940) described the presence of blood in the stools. Some writers attribute many common symptoms in infancy to milk allergy; but we, in agreement with Bachman and Dees (1957), regard as unconvincing the evidence for milk allergy being a cause of such conditions as colic, a constant runny nose, a cough, or persistent crying. Warren (1957) described a case which presented with marasmus. Ascites, a prominent feature in our first case, has to our knowledge not been previously reported and led to much diagnostic difficulty; another unusual feature was the high fever, so that the picture at first suggested a severe infection rather than allergy. The symptoms and signs in our second case were more typical; spikes of fever again accompanied reactions.

Diagnosis

The diagnosis is usually made on clinical grounds and without inquiry into the diet is apt to be missed. Sometimes, as in our first case, the diagnosis is not made until the second attempt at introducing cow's milk has led to relapse. The diagnosis is confirmed by the rapid improvement that occurs when cow's milk is replaced by breast milk and the recurrence of symptoms when cow's milk is reintroduced. We agree with Vest (1953) that further tests are often unnecessary and at times their results are difficult to interpret.

Direct Skin Test.—Most writers (Hill, 1939; Loveless, 1950; Miller, 1950; Rosenblum and Rosenblum, 1952; Collins-Williams, 1955; Tudor, 1956; Bachman and Dees, 1957) find this test of little value; positive results are not conclusive, and negative results do not rule out the diagnosis. If the test is of limited value in diagnosis, it gives even less help in choosing a substitute for cow's milk. Despite negative skin tests, both our patients were unable to tolerate soyolk, and Case 1 reacted similarly to nutramigen.

Passive Transfer Test (Prausnitz–Küstner Reaction).—This test is useful and when positive is proof of allergy (Miller, 1950), but a negative reaction does not rule out the diagnosis. Positive reactions may be commoner in patients with acute allergy. Thus in our first case the reaction was positive, while in our second case, with less severe manifestations, it was negative.

Eosinophils in Stools.—Rosenblum and Rosenblum (1952) and Bigler (1955) stressed the value of this test, but Bachman and Dees (1957) found it disappointing.

Progress

Death from milk allergy undoubtedly occurs (Holzel, 1955), and possibly is not quite as rare as a search of the literature would suggest. The clinical picture in our first case made us realize how easily we might have arrived at a mistaken diagnosis of "overwhelming infection with intense toxaemia," and if the infant had died not even the necropsy examination would have given the correct diagnosis.

In the survivors the condition is commonly self-limited and cow's milk is tolerated during the second six months of the first year (Clein, 1951; Rosenblum and Rosenblum, 1952; Vest, 1953), but according to Clein 15% of cases remain sensitive to cow's milk. As both our cases were given desensitization courses we cannot comment on this point.

Sequelae.—Eczema and other allergic manifestations were regarded as common by Rubin (1940), but as uncommon by Vest (1953) and Collins-Williams (1955). Except for a small patch of eczema in our first case we noted no such manifestations, not even when during the later months of infancy food substances other than milk were introduced into the diet. Cumming (1928) mentioned that in his case of extreme hypersensitivity weaning was very troublesome; in our second case we had the greatest difficulty in persuading the infant to take feeds from the bottle and for long periods had to resort to feeding by oesophageal tube. Even some time after desensitization an intense distaste for cow's milk persisted and presented a real problem in management.

Treatment

Immediate treatment consists of withdrawal of cow's milk and, in cases of acute reactions, treatment for shock. Breast milk is the feed of choice, but if it is not immediately available a clear fluid mixture—for example, 5% sugar in one-fifth normal saline—can be used to tide the infant over the immediate emergency. A breast-milk bank provides an invaluable service for these infants, but as they may remain intolerant of cow's milk for several months it is unwise to rely entirely on this service; therefore the search for a substitute should start as soon as possible. In this search, which may be difficult and at times, as in our second case, fruitless, one has little to guide one but trial and error.

1. *Evaporated Milk.*—Ratner and Gruehl (1935) and Collins-Williams (1955) suggested that evaporated milk is somewhat less allergenic than boiled, dried, pasteurized, or unmodified cow's milk, but Collins-Williams's (1955) case of allergic shock occurred after evaporated milk.

2. *Goat's Milk.*—According to the literature on severe cow's milk allergy, goat's milk is a valuable substitute (Hill, 1939). However, our patients gave strongly positive skin reactions with goat's milk and, more significant, the second patient vomited immediately after the first trial feed.

3. *Soya-bean Milk.*—Most writers have had good results with this preparation (Clein, 1951; Rosenblum and Rosenblum, 1952; Vest, 1953; Ratner *et al.*, 1955; Collins-Williams, 1956; Tudor, 1956); but cases of sensitivity to it are on record (Vest, 1953), and our two cases were sensitive.

4. *Nutramigen.*—Unlike Rosenblum and Rosenblum (1952) we found nutramigen of no value in the patient on whom it was tried.

5. *Allergilac* is prepared specially for use in infantile eczema; we have not seen a mention of its use in severe cow's milk allergy, and were surprised to find it so successful in our first case.

6. *Other Substitutes.*—Vest (1953) suggested the flour of various nuts or 10% oatmeal porridge and wheat germs, and Holzel (1955) described a pudding made with "farex" and eggs.

Desensitization.—Vest (1953) stated that cow's milk is best avoided until cure has occurred—that is, until the infant can tolerate cow's milk without desensitization. Collins-Williams (1955) described a case in which desensitization was not started until the age of 7½ months, and even at 2½ years only four teaspoonfuls of cow's milk could be given in a day. When, as in our second case, the infant has to be reared on expressed breast milk, desensitization is urgent, as supplies of breast milk are not inexhaustible. Even when a substitute has been found, it would still seem preferable to start desensitization early, because the nutritional adequacy of the substitute food will often be in doubt (Fries, 1957) and because weaning on to solid foods will be easier if the patient can already tolerate cow's milk. We suggest that desensitization is started when the infant has fully recovered from the acute allergic illness and is making a satisfactory gain in weight. In the first case this was three months after admission, at the age of 4 months, and in the second case five weeks after admission, at the age of 7½ months.

Summary

Two cases of severe cow's-milk allergy are described. In one patient, in addition to the severe collapse produced by the first feed of cow's milk, ascites was a

presenting feature and caused diagnostic difficulty. In the second patient gastro-intestinal symptoms and urticaria after feeding with cow's milk were followed by refusal of milk which persisted for some weeks after desensitization.

Diagnosis of cow's-milk allergy is mainly clinical. The passive transfer test is a useful aid, but the direct skin test is of little value. Treatment consists in withdrawal of cow's milk and substitution of a suitable alternative, the choice of which is a matter of trial and error. Alternatively, desensitization to the milk is carried out.

REFERENCES

Ashby, H. T. (1929). *Arch. Dis. Childh.*, **4**, 264.
Bachman, K. D., and Dees, S. C. (1957). *Pediatrics*, **20**, 393.
Bigler, J. A. (1955). *Pediat. Clin. N. Amer.*, **2**, 503.
Clein, N. W. (1951). *Ann. Allergy*, **9**, 195.
Collins-Williams, C. (1955). Ibid., **13**, 415.
—— (1956). *J. Pediat.*, **48**, 39.
Cumming, W. M. (1928). *Arch. Dis. Childh.*, **3**, 296.
Fries, J. H. (1957). *J. Amer. med. Ass.*, **165**, 1542.
Hill, L. W. (1939). *J. Pediat.*, **15**, 157.
Holzel, A. (1955). In *Paediatrics for the Practitioner*, edited by W. Gaisford and R. Lightwood, 3, 159. Butterworth, London.
Loveless, M. H. (1950). *J. Allergy*, **21**, 489.
Miller, M. M. (1950). In *Postgraduate Gastroenterology*, edited by H. L. Bockus, p. 275. Saunders, Philadelphia and London.
Ratner, B., and Gruehl, H. L. (1935). *Amer. J. Dis. Child.*, **49**, 287.
—— Untracht, S., Crawford, L. V., Malone, H. J., and Retsina, M. (1955). *Amer. J. Dis. Child.*, **89**, 187.
Rosenblum, A. H., and Rosenblum, P. (1952). *Pediatrics*, **9**, 311.
Rubin, M. I. (1940). *Amer. J. med. Sci.*, **200**, 385.
Sheldon, W. (1951). *Diseases of Infancy and Childhood*, 6th ed., p. 69. Churchill, London.
De Toni, E., and Mitolo, G. R. (1955). *Lattante*, **26**, 562.
Tudor, R. B. (1956). *J. Lancet*, **76**, 245.
Vest, M. (1953). *Ann. paediat. (Basel)*, **181**, 277.
Warren, P. (1957). *Brit. med. J.*, **2**, 985.

DIABETIC COMA IN INFANCY*

BY

D. W. BEAVEN, M.B., M.R.C.P., M.R.C.P.Ed. M.R.A.C.P.

Christchurch Hospital, New Zealand

During infancy diabetes mellitus presents as an acute metabolic disturbance.

Both Gaisford and Lightwood (1954) and Paterson (1956) state that diabetes is very rarely seen under the age of 1 year, but Schwartzman *et al.* (1947) collected details of 57 cases in this age group, and Keidan (1955), reviewing the literature, added 22 cases, six of these being transient in the first month of life.

Since that time sporadic cases only have been reported, but details of the following two cases are presented "to augment the knowledge of this group" (Schwartzman *et al.*, 1947). As guidance on the management of diabetic coma in small babies is difficult to obtain, certain aspects of treatment have been discussed. These comments are based on experience in these two cases, on a further two cases in patients under the age of 2 years (not reported here), and on the available literature. Recent experience in the treatment of problems in adult diabetic coma has been utilized and adapted.

Case 1

A full-term female baby born on October 30, 1954 (Birth weight 2.6 kg.), progressed normally until she was first admitted to hospital on July 10, 1955, with irritability, cough, loose bowel motions, and temperature suggesting an infection of the upper respiratory tract. Various investigations were carried out with negative results, and the temperature slowly settled on penicillin therapy. At this time the urine showed a trace of reducing substance on one occasion, but not on four other occasions. The C.S.F. sugar was 80 mg./100 ml. She was discharged home five weeks later with a diagnosis of recurrent bronchitis.

She was readmitted on October 18, at the age of 11½ months, with a cough and rapid respiration and dehydration, the diagnosis being pneumonia. By next morning drowsiness had increased and a diagnosis of probable diabetic acidosis was made. Blood sugar was 400 mg./100 ml. and serum electrolytes showed a severe primary metabolic acidosis with *p*H 7.18; CO_2 tension, 22 mm. Hg; blood buffer base, 26 mEq/l.; bircarbonate 7.8 mEq/l.; sodium, 146 mEq/l.; potassium, 3.6 mEq/l.; chlorides, 120 mEq/l. Serum keto-acids were 180 mg./100 ml. Her weight was 18 lb. (8.1 kg.).

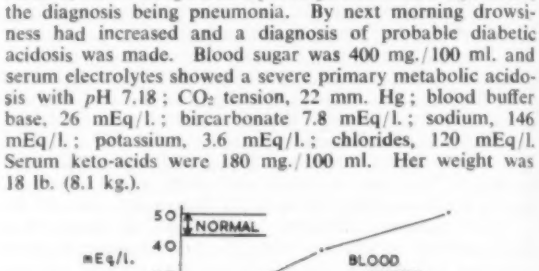


FIG. 1.—Details of treatment, showing blood-sugar levels, serum potassium levels, and improvement in acidosis in Case 1.

Soluble insulin was started at 1 p.m., and Fig. 1 shows that an initial insulin dosage of 80 units was required before some control of the blood sugar was obtained. The blood buffer base rose steadily with the correction of the acidosis and with 150 ml. of 1/6 molar sodium lactate solution given intravenously.

The initially rather low potassium fell to 1.7 mEq/l. within 24 hours of starting treatment. During this period calcium gluconate was given intravenously on two occasions for fits of a decerebrate nature with relief of twitchings. On these two occasions the blood sugar was 350 mg. and 110 mg. respectively. (The low serum potassium may have played some part in her slow recovery from drowsiness, but the irritability may have been related to the relative increase in alkalinity.) After the first 24 hours soluble insulin was given according to urine tests three times daily, the total daily dosage being 20–30 units.

Insulin zinc suspension was begun on the fourth day, when solid foods were again taken. The dosage was steadily increased, and she was finally discharged after a respiratory infection on 20 units of I.Z.S. and a 1,200 calorie diet. Before discharge the chest *x*-ray picture was clear and the ocular fundi were reported normal by the ophthalmologist.

Over the next year she was on a diet averaging 1,200 calories (distributed as protein 40 g., carbohydrate 160 g., and fat 40 g.) and gained 11 lb. (5 kg.), to weigh 29 lb. (13.2 kg.) and measure 34 in. (86 cm.). The height and weight are at the upper limit of normal for her age.

The insulin dosage for this age and weight was 16 units of I.Z.S., and the blood sugars two and a half and two hours after meals were 95 and 105 mg./100 ml.

*Based on papers read before the Annual Meeting of the New Zealand Paediatric Association in 1956 and 1957.

Case 2

A female baby born on December 25, 1954—birth weight 8 lb. 6 oz. (3.8 kg.)—was quite well until the morning of her admission to hospital on December 10, 1955, when she was noticed to be drowsy and "off-colour," with sunken eyes. She became increasingly breathless during the day and was admitted to hospital at 6.30 p.m. with a diagnosis of pneumonia.

On admission she was a dehydrated semiconscious infant with cold extremities, rapid grunting respirations, and a few moist sounds in the left chest; respirations 64 a minute, and pulse 170 a minute. A tentative diagnosis of diabetic coma with respiratory infection was made and an intravenous drip inserted. Blood-sugar results were 1,000 and 950 mg./100 ml., and the serum electrolytes were as follows: blood *p*H 7.08; CO_2 tension, 19.5 mm. Hg; blood buffer base 24 mEq/l.; plasma bicarbonate, 5.6 mEq/l., which was in keeping with the marked respiratory compensation. Her plasma sodium was 140 mEq/l.; potassium, 4.6 mEq/l.; chlorides, 102 mEq/l.; proteins, 8.7 g./100 ml.; P.C.V., 43%; serum keto-acids, 100 mg./100 ml.

Soluble insulin, 10 units intravenously and 20 units intramuscularly, was given at 8 p.m., and two and a half hours later a further 50 units was given intramuscularly, when there was no fall in the blood sugar. By 4 a.m., with a falling blood sugar (700 mg.), only a further 20 units of insulin was given, and this total of 100 units was sufficient to keep the blood sugar below 200 mg. for the next 30 hours.

Fluids in the first 24 hours for this 20-lb. (9.1-kg.) baby are shown in Table I. At 18 hours these fluids had resulted in a hypernatraemia of 157 mEq/l., and the drip was discontinued at 20 hours, when adequate fluids were being taken by mouth.

TABLE I.—*Fluids Given During First 24 Hours of Diabetic Coma*

Case 1	8.1 kg.	255 ml. per kg. body weight
,, 2	9·1 ,,	229 ,, ,, ,, ,, ,,
Case not reported ..	10·2 ,,	250 ,, ,, ,, ,, ,,

Details of Fluids in Case 2 during First 24 Hours

Type of Solution	Route	Vol. in ml.
1·6 molar sodium lactate	Intravenous	150
Isotonic saline	,,	160
5% glucose solution	,,	400
5% glucose with 1·5 N saline ..	,,	250
"1/2 normal" saline	Subcutaneous	220
Glucose solutions	Oral	420
Total all routes		1,600

For the next week soluble insulin was given six hourly, according to urine tests, and on the eighth day I.Z.S. and a 1,100-calorie diet were started. This dosage was later reduced to 16 units, but the baby was kept in hospital for a further three months on account of a throat infection, an attack of rubella, and also home circumstances, but was finally discharged on March 22, 1956 on 30 units of I.Z.S. daily and a fairly free diet of about 1,250 calories. Capillary blood sugars morning and evening on this gave figures of 200–250 and 85–150 mg./100 ml.

At home this dosage has gradually been reduced over the past year to 24 units of I.Z.S. daily. At 22 months her weight was 28 lb. (12.9 kg.) and blood sugar 105 mg./100 ml. two and a half hours after dinner.

Discussion

Mortality.—Between 1925 and 1946 the mortality averaged 45–50% for collected cases of diabetes in infants under the age of 1 year, but in more recent series reported by Brodribb *et al.* (1952) and by Keidan (1955) the mortality is nearer 25%.

Presentation.—These two cases and our other young diabetics illustrate a point stressed in the literature—namely, that an erroneous diagnosis of respiratory infection or meningitis is often made. Where there is a relative hypokalaemia with a low blood *p*H depression of the respiratory centre may result and the typical Kussmaul respiration may be reduced or absent. This finding has recently been reported in a number of adults by Murray (1958), and infants are particularly liable to develop a severe metabolic disturbance. The admission diagnoses in the 12 most recently reported cases of diabetes mellitus under 1 year of age were pneumonia in 4, meningitis in 4, dehydration and infection in 1, "shock" in 1, and diabetes in 1. Newcomb (1951) reported that symptoms pointing to the respiratory system (tachypnoea and fever) were present in all of their six cases in diabetic coma, and signs in the chest were found on auscultation in four of his cases.

The diagnosis may easily be missed, and diabetic acidosis should be considered in any baby with respiratory signs and symptoms and dehydration who does not improve on treatment.

Age of Onset (Table II).—Keidan (1955) has commented on the age distribution at the beginning and end of the first year of life. This may be due to selection of cases, because

TABLE II.—*Age Distribution of 79 Reported Cases of Diabetic Coma Under the Age of 1 Year*

0–3 Months	4–6 Months	7–9 Months	10–12 Months
29	12	10	28

of greater interest in the neonatal group or because of inclusion in the first three months of all the cases of transient diabetes.

Sex Incidence.—Of the 80-odd reported cases male babies predominate 2:1.

Influence of Heredity.—In Schwartzman's series of 57 cases and Keidan's additional collected 22 cases a positive family history of diabetes mellitus was given in 43% of cases. A history on both sides of the family may be helpful in diagnosis, but in New Zealand and Australia it is often difficult to obtain relevant data about grandparents. Fig. 2 shows the family history in Case 2, with the birth weights where known. The mothers of both these infants had a flattened type of curve on glucose-tolerance testing, suggesting an increased tolerance for glucose, but the significance of this finding is not clear.

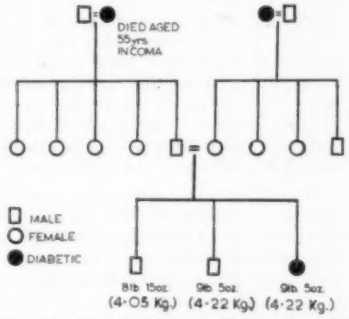


FIG. 2.—Family history of Case 2, with birth weights where known.

Management of Coma

Both in these cases and in the older children adequate biochemical control during the first 24 hours is essential. For some time it has been the practice in this hospital for blood to be withdrawn in the casualty or admitting department in all cases of diabetic coma, and also in cases of acidosis in babies.

Correction of Acidosis.—In those cases with a severe ketonaemia the *p*H, even with adequate respiratory compensation, may fall below 7.2. It appears likely from the work of Kety *et al.* (1948), and also from work on anaesthetic cases by Murray (1958), that depression of medullary centres takes place with low *p*H figures. Murray has reported three cases in severe diabetic acidosis with absence of Kussmaul respiration because of respiratory centre depression at low *p*H figures. It has been our practice to use 1/6 molar sodium lactate solution or bicarbonate solution as the initial intravenous fluid whenever severe acidosis is present. Lactate

solution offers some advantage over sodium bicarbonate solution in being more stable and also in providing a glucogenic effect (60 ml. of 1/6 molar sodium lactate per kg. body weight possesses a glucose potential of 0.9 g./kg.). Hartmann and Erganian (1947) recommend 30 ml. of sodium lactate per kg. body weight initially, but in these two cases the average figure was 20 ml./kg. In two other patients between the ages of 1 and 2 years about 15 ml./kg. body weight has been used in the initial 12-hour period. Hartmann and Erganian have also shown that, in comparison with the use of isotonic saline and insulin, sodium lactate solutions will produce a more rapid improvement and so lessen the danger to the cerebral cells of an unduly prolonged low serum *p*H.

Insulin Requirements.—Reports on the dosage of insulin given to infants in diabetic coma vary from the successfully treated patient of Gans (1954)—5½ lb. (2.5 kg.)—who was given 250 units of insulin in the first 24 hours, to that of Hartmann and Erganian, who recommended 1½ units/lb. (3.3 units/kg.) body weight initially to be repeated in six hours as necessary. Nelson (1954) recommends an initial dosage of 20–30 units at the age of 1 year, and thereafter about half the amount in one to two hours. The insulin dosage used in babies in diabetic coma with severe acidosis is shown in Table III. Thus on body weight an initial

TABLE III.—*Insulin Dosage in First 24 Hours. Babies in Diabetic Coma*

	Diabetic Coma		
100 units	8.1 kg.	Case 1	11 months
100 ,,	9·1 ,,	,, 2	11 ,,
175 ,,	10·3 ,,	—	19 ,,
110 ,,	16·0 ,,	—	29 ,,

dosage of about 3 units/kg. (or 1½ units/lb.) is advisable, with an additional dosage of 2 units/kg. (or 1 unit/lb.) where the plasma keto-acid level is over 150 mg./100 ml. (Dumm and Shipley, 1946). A gradation of this dosage should be repeated in three to four hours, when the report on further blood-sugar and keto-acid estimations come to hand. There seems to be no advantage in the common practice of hourly injection of insulin. Better control is achieved when insulin is given on the results of these four-hourly blood-sugar and keto-acid estimations.

Hypoglycaemia.—There are many references to hypoglycaemia occurring towards the end of the first 24 hours in the treatment of diabetic coma. We have noticed repeatedly that soluble insulin may have a duration of action up to 36 hours where ketonaemia persists. Even with intramuscular instead of subcutaneous injections its action may still last for 24 hours. Fig. 3 shows the prolonged action of insulin in Case 2. Heberden and Friedlander (1955) have mentioned the use of cortisone, sedation, and hypothermia in the treatment of prolonged hypoglycaemic attacks unresponsive to intravenous glucose solutions. They also re-emphasize the cerebral damage which can occur with hypoglycaemic attacks in infants.

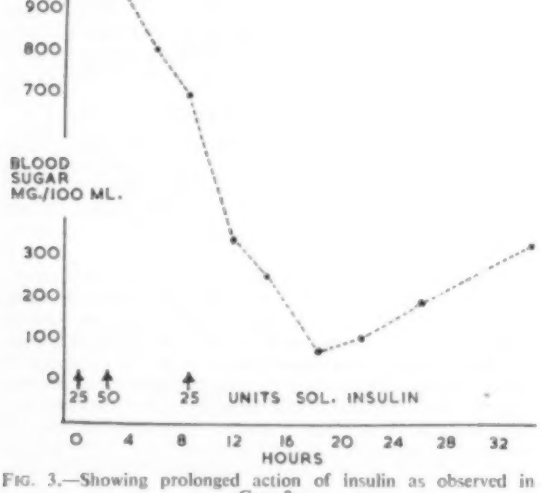


FIG. 3.—Showing prolonged action of insulin as observed in Case 2.

Fluids.—The intravenous fluid given initially will largely depend upon the degree of acidosis and the plasma sodium level. The use of 1/6 molar sodium lactate solutions has already been discussed in those cases where severe and dangerous acidosis is present. In one of our recent cases (10.2 kg., 19 months) hypernatraemia was present before treatment, and Case 2 became hypernatraemic during minimal sodium therapy. We believe that this hypernatraemia which occasionally occurs is due to loss of a greater amount of water than sodium and may prejudice the chances of survival in patients in severe diabetic coma. Murray and Beaven (1958) have reported 16 cases of hypernatraemia occurring in diabetic coma, and we suggest that this produces a very severe intracellular dehydration on account of the extreme plasma osmolarity. Where hypernatraemia exists only glucose-containing solutions should be given in the first few hours or until the serum sodium falls. Where initial serum sodium levels are not low, caution is necessary with sodium-containing solutions. The amount of fluid administered in the first 24 hours in three of our cases is shown in Table I, but we are guided by clinical signs of dehydration and serial estimations of packed cell volume, total N.P.N., and plasma proteins. In the treatment of one of these infants and in bigger babies we have used 1/5 or 1/2 normal saline solution with hyalase subcutaneously where the taking of oral fluids has been slow after removal of the intravenous infusion. Plasma can be used as in adults on a body-weight basis where shock does not improve with the correction of the acidosis.

Hypokalaemia.—An initially low serum potassium or an abrupt fall at the four-hour electrolyte estimation should give warning of impending hypokalaemia. In Case 1 intravenous potassium was not given early enough, and fits of a decerebrate nature occurred when the potassium level was 1.7 mEq/l. Low serum potassium levels are particularly dangerous in association with persisting acidosis, as it may further aggravate the depression of the cerebral cells.

Stabilization.—On recovery from coma, stabilization is achieved by means of a fixed calorie diet with soluble insulin given three times daily and I.Z.S. started some time in the first week. At home we have encouraged the parents to try to maintain a low-fat diet which must of necessity be fairly free in other respects. The daily insulin dosage is adjusted according to the previous day's tests.

Follow-up.—One year after discharge both babies were fully re-examined and their diet was adjusted. At the same time several capillary blood-sugar levels were taken to estimate the degree of control. With the onset of diabetes in infancy or early childhood the ultimate prognosis will depend upon a number of factors, not least of which is the intelligence of the parents and how far they are prepared to co-operate with the enthusiasm of their family doctor. Arterial changes and eye complications may develop within a shorter period than in adults, but Wilson *et al.* (1951) present evidence to suggest that good control of urine sugar may possibly delay the onset of arterial complications.

Conclusion and Summary

Two cases of diabetic coma under the age of 1 year are reported.

The comparative rarity of reported cases in this age group is noted and it is suggested that cases may masquerade as meningitis or pneumonia.

The history of familial incidence may be over 40% where accurate information is available.

Some aspects of the management of diabetic coma in small babies have been discussed. These include: the value of 1/6 molar sodium lactate solution; some suggestions on insulin dosage; frequency of hypoglycaemia due to prolonged insulin action; hypernatraemia; and hypokalaemia.

The importance of parental intelligence and co-operation in subsequent management is stressed.

I thank Dr. J. F. Landreth, senior paediatrician to the Christchurch Hospital, for permission to report these cases and for his help and encouragement; and Mr. J. T. Murray, biochemist, for his enthusiasm for electrolyte estimations at all hours and for first drawing my attention to some of the problems of acidosis and of hypernatraemia in diabetic coma.

REFERENCES

Brodribb, H. S., McMurray, J., and Scott, L. G. (1952). *Brit. med. J.*, **1**, 1060.
Dumm, R. M., and Shipley, R. A. (1946). *J. Lab. clin. Med.*, **31**, 1162.
Gaisford, N., and Lightwood, R. (1954). *Paediatrics for the Practitioner*. 2, 54. Butterworth, London.
Gans, B. (1954). *Proc. roy. Soc. Med.*, **47**, 132.
Hartmann, A. F., and Erganian, J. (1947). *J. Pediat.*, **31**, 274.
Heberden, P., and Friedlander, F. (1955). *Arch. Dis. Childh.*, **30**, 372.
Keidan, S. E. (1955). Ibid., **30**, 291.
Kety, S. S., Shenkin, H. A., and Schmidt, C. F. (1948). *J. clin. Invest.*, **27**, 493.
Murray, J. T. (1958). In press.
—— and Beaven, D. W. (1958). *Quart. J. Med.* In press.
Nelson, W. E. (1954). *Textbook of Pediatrics*, 6th ed., p. 1280. Saunders, Philadelphia.
Newcomb, A. L. (1951). *Illinois med. J.*, **99**, 204.
Paterson, D. (1956). *Sick Children*, 7th ed. Cassell, London.
Schwartzman, J., Crusius, M. E., and Beirne, D. P. (1947). *Amer. J. Dis. Child.*, **74**, 587.
Wilson, J. L., Root, H. F., and Marble, A. (1951). *Amer. J. med. Sci.*, **221**, 479.

AETIOLOGY AND TREATMENT OF CONGENITAL DEAF-MUTISM

BY

J. McKENZIE, M.D.

Lecturer in Embryology, Department of Anatomy, University of Aberdeen

During an investigation into the problem of congenital abnormalities of the head it was noted that occasionally a child showing obvious maldevelopment of the first visceral arch was also deaf-mute, although the external ear and auditory meatus were normal. Attention was thereby drawn to the possibility of a close connexion between deaf-mutism and abnormal development of the first arch.

The cases described below show little or no obvious evidence of first-arch defect, and the above premise suggested the clinical experiment of determining whether their deaf-mutism was associated with middle-ear (first arch) defect.

Case 1

A boy aged 11 was suspected at the age of 2 years of having middle-ear deafness, "possibly from infection in the first few months of life." When he was first examined it was reported that he did hear—cochleo-palpebral reflex was present but weak. The surgeon had the impression when using tuning-forks that it was a conduction deafness, but was not at all certain. Although six months later (aged 2½) the child showed signs, with pure-tone bone-conduction audiometry, of a severe upper-tone loss in both ears, a tentative diagnosis of air-conduction deafness associated with mental deficiency was made.

At 3½ years co-operation was said to be non-existent during clinical examination; a muscular tic reported a year previously was more pronounced. No final diagnosis was reached, and special schooling was recommended. No other member of the family suffered from deafness or congenital abnormality, and *x*-ray examination of the skull was normal. Fig. 1 shows the result of audiometry examination (May, 1957); deafness is shown to be profound, but the marked discrepancy between air-conduction and bone-conduction hearing indicates that at the lower frequencies the deafness is essentially of middle-ear origin, although the upper-tone loss suggests inner-ear deafness.

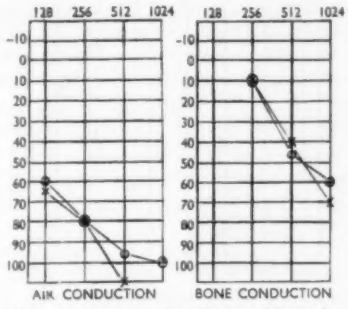


FIG. 1.—Case 1. O = Right. X = Left.

Case 2

A girl aged 9½ was found most difficult to examine at the age of 2, when the cochleo-palpebral reflex was elicited on very slight stimulus. At 5 years of age the only finding of note was a single islet of hearing at 1,024 cycles revealed by pure-tone audiometry. She was a pleasant, but very shy, timid, little girl, and of her relatives only an aunt of her mother's was reported to have been born deaf; no further information was available. The patient was consigned to a school for the deaf without further attempts to arrive at the cause or nature of the deafness. At school she was given and wore an air-conduction hearing-aid as a routine, but it was not regarded as being of much help to her. The skull was normal on *x*-ray examination. Audiometry (Fig. 2) revealed a deafness strikingly similar to that of Case 1.

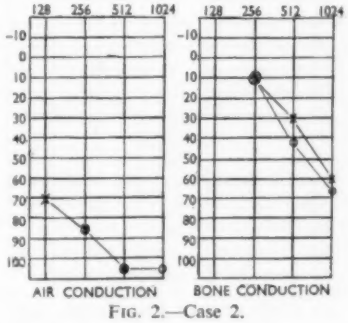


FIG. 2.—Case 2.

Cases 3, 4, and 5

Three children aged 12, 9, and 9, respectively (the latter two being twins) were all members of one family suffering from a congenital deafness, which must be hereditary. The mother was born deaf, but the trait could not be traced further back on her side of the family. The father was one of five deaf-mute sons in a family of nine; one of his affected brothers died in a mental hospital, where another was still an inmate; the others and the father of the three patients were normal apart from the deafness. *X*-ray

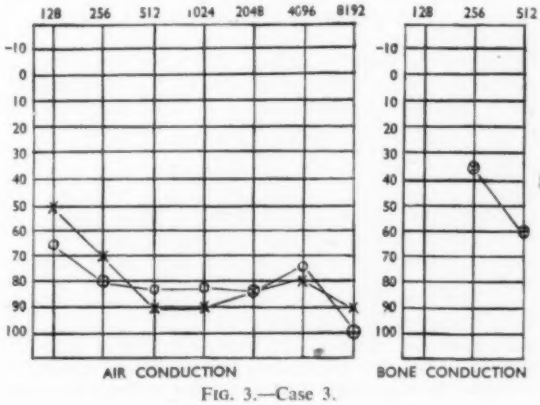


FIG. 3.—Case 3.

examination of the skull was normal in all three cases. Audiometry examination (Figs. 3, 4, and 5) was very similar in each case to those of Cases 1 and 2. There had been no previous otological or audiometry examination of these children, and all have been wearing air-conduction hearing-aids at the school for the deaf.

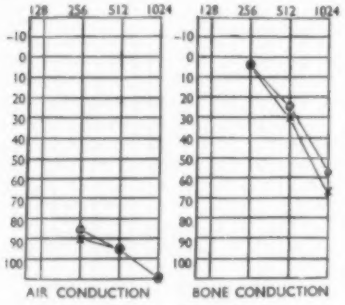


FIG. 4.—Case 4.

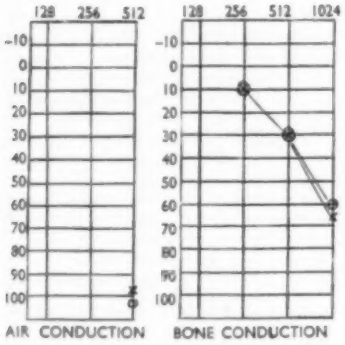


FIG. 5.—Case 5.

Careful attention was given to the possibility of the child confusing hearing with vibration during bone conduction testing, and in each case we were satisfied that the patient was able to differentiate them clearly.

Discussion

No one has ever suggested that congenital deaf-mutism may be of middle-ear origin; in fact, the condition is generally regarded as an affliction of the internal ear. Wilson (1955) deals very briefly with congenital abnormalities of the internal ear, merely saying, "This subject is inextricably mixed up with deaf-mutism, to the chapter on which the reader is referred"; in that chapter he mentions only once the involvement of the middle ear in cases of congenital deaf-mutism—namely, as an incidental finding when the cause is syphilis, and that, he says, is infrequent.

Recently there has been an awareness that few children are completely deaf. The majority of those recognized as deaf-mutes are classified as "profoundly deaf," and schools, unfortunately with different principles of teaching, have been established for these children. Speech-training at first meant finger-spelling, but very soon attempts to teach them to speak were begun. Lip-reading was encouraged, but efforts have more recently been directed towards making the children hear as much as possible in their training. All children attending these schools use hearing-aids, either individual or group models of the air-conducting type.

The results of this investigation are surprising and unexpected. Testing by air conduction showed profound deafness, while by bone conduction there was remarkably good hearing at the lower frequencies, with no response whatsoever to the higher. There is undoubtedly a marked internal-ear or perceptive deafness, but the picture is dominated by the degree of air-conduction deafness, a feature so far unsuspected by clinician or teacher.

The full significance of this discovery is, first, that congenital deaf-mutism is not due entirely to an internal-ear or perceptive deafness, and, second, that if these children are to be expected to hear as much as possible then bone-conduction hearing-aids should be used. One great objection to this type of aid is the size and weight of the batteries supplied for the instrument, but there appear to be no technical difficulties in producing more suitable batteries. The third point also concerns the treatment. From bone-conduction audiometry it is obvious that there is an appreciable cochlear defect—almost normal hearing at the lower tones "tailing off" to give no response at the upper tones; the loss is neither irregular nor patchy. The difference between air- and bone-conduction readings points to gross middle-ear involvement and shows that it is the more serious, although, clinically, the middle ears of such patients had been regarded as normal.

The problem being one of deciding which is the primary defect, three reasons are offered for regarding the middle ear as being initially at fault. (1) Two congenitally deaf-mute children, unfortunately too young to co-operate in the examination, showed obvious deformities of the first visceral arch, and this arch contributes to the formation of the middle-ear structures. (2) The middle-ear deafness was greater in all those examined, and it is unlikely that a less degree of perceptive deafness could cause a major degree of conduction deafness. (3) While the cochlea and middle ear are closely associated functionally, the structural association between the cochlea and vestibular apparatus is even greater; yet in children with congenital deaf-mutism it is unknown to find lack of balance due to coincident involvement of the vestibular apparatus (except in cases of syphilitic infection). If the defect were primarily labyrinthine and secondarily middle ear, then surely signs of involvement of the vestibular part would be found in at least some of the cases, especially those who are absolutely deaf.

No morphological evidence of a defect of the middle ear in these cases is available; *x*-ray examination with various projections has been of no assistance in identifying the presence or absence of the ossicles, far less their normality, but the difficulties of radiodiagnosis in this region are well recognized (Hodgson, 1951).

Whether the congenital abnormality of the middle ear is minimal or gross, its effect is clearly that of interrupting the transmission of vibrations to the internal ear. A developmental defect such as this, arising in the early weeks of intrauterine life, must have an effect on the associated parts of the hearing mechanism, and it may be best expressed as a loss of stimulation to further development of the inner ear. Whether this loss takes effect during the remainder of intrauterine life, thereby leading to structural maldevelopment, or whether the effect occurs in the equally obscure and unknown period of the development of hearing—namely, in the first few months of life—is a matter for conjecture, but it is much more likely to be after birth, when the initial abnormal changes will be functional rather than structural. Thus the pathological processes are in the nature of a disuse atrophy of the cochlea. Accordingly, not only must the training of the deaf-mute comprise the use of a bone-conducting aid, but it must also start as early as possible, at a stage when it may still be possible to retrieve leeway lost in the first few months of life.

Even if all cases of deaf-mutism do not arise from primary defects of the middle ear, the disadvantage of fitting each child with an elaborate hearing-aid and awaiting the result of audiometry examination at the age of 7 or 8 is far outweighed by the advantages which are sure to accrue from the earliest stimulation of what hearing exists. By this means it is likely that little, if any, perceptive hearing loss (except perhaps in the highest tones) will be present by the time the child is old enough to be examined properly; and in the meantime it is likely that speech will have advanced to nearly normal standards.

The interrelationship of a wide field of congenital abnormalities of the head and neck will be described in a subsequent publication, but the findings in regard to congenital deaf-mutism were considered important enough to warrant this preliminary report and a discussion on its aetiology.

Summary

The results of audiometric examination in five deaf-mute children are presented. In each case the degree of hearing by bone conduction is much greater than that by air conduction, an indication that the primary defect is

the result of congenital maldevelopment of the middle ear and not of the inner ear, as is generally supposed. In order to stimulate and improve the residual hearing in these children treatment should therefore begin at the earliest possible age with the use of a bone-conducting hearing-aid.

I am greatly indebted to Professor R. D. Lockhart for his encouragement and advice during this investigation, to Mr. I. S. D. Thomson for allowing me access to his notes on Cases 1 and 2, and to Miss J. C. Macrae for carrying out all the audiometry examinations.

REFERENCES

Hodgson, H. G. (1951). *Textbook of X-ray Diagnosis by British Authors*, 2nd ed., vol. 1. Lewis, London.
Wilson, T. G. (1955). *Diseases of the Ear, Nose and Throat in Children*. Heinemann, London.

HYDATID COMPLEMENT-FIXATION TEST: INFLUENCE OF INTERMEDIATE HOST PROTEIN ON SPECIFICITY OF SHEEP HYDATID FLUID ANTIGEN

BY

H. J. BENSTED, O.B.E., *M.C.*, M.R.C.P.*
Lieutenant-Colonel, R.A.M.C. (Ret.)

AND

J. D. ATKINSON, F.I.M.L.T.
From the Central Public Health Laboratory, Colindale, London

Kellaway and Fairley (1932) considered the hydatid complement-fixation test to be specific, and we (Bensted and Atkinson, 1953), reporting on the examination with standardized reagents of a small series of cases, fully supported this opinion. Since that time a further series of over 300 cases of suspected hydatid disease have been examined serologically by the same technique, and out of 70 cases, subsequently proved to be hydatid disease, significant complement-fixing antibody was demonstrated in the serum of 61 of the patients concerned. There were 240 patients in whom further investigation showed that their condition was due to some disease other than hydatid. Sera from all but one of these patients gave negative results in the hydatid complement-fixation test. It is this false-positive result—the first in our experience—that initiated the investigations recorded in this communication. The explanation proved to be simple, and once the facts were known the results of the investigations were in full accord with what was expected. Nevertheless some interesting observations were made which seemed worthy of record as they had not, so far as is known, previously been published.

During radiological examination the patient in question had been found to have a suspicious shadow in the lung, and blood serum had been forwarded for the C.F.T. to exclude hydatid disease. The Casoni test had been reported as negative, but the C.F.T. with the standardized sheep hydatid fluid antigen was positive to a titre of 1 in 16. Further clinical investigations, however, revealed that the patient had a carcinoma of the lung. The disease ended fatally in a short time and no evidence of a hydatid cyst was found.

*Now at the Lister Institute of Preventive Medicine, Chelsea Bridge Road, London, S.W.1.

It was at first thought that the complement fixation might have been due to the development of some non-specific reacting substance associated with the rapidly growing neoplasm, but our records showed that 12 similar cases of carcinoma of the lung had been examined serologically for the presence of hydatid complement-fixing antibody and in all the test had been completely negative. Further inquiries, however, revealed that the patient had recently returned to this country from the Middle East, where, a few weeks before sailing, he had been bitten by a rabid dog and had been given a "full course" of a sheep-brain anti-rabies vaccine.

Some time after this incident, and additional to the series referred to above, a similar case came to light. In this case, however, the anti-rabies vaccine had been given some years previously. Two Casoni tests gave atypical delayed reactions, and the C.F.T. performed after a short interval showed partial fixation at a titre of 1 in 2 only. The case subsequently proved to be carcinoma of the lung.

Without the history of the previous case these results would doubtlessly have been disregarded, but now the possibility of sheep-protein sensitization from the sheep-brain anti-rabies vaccine and the boosting effect of the intradermal injections of the sheep hydatid fluid (for the Casoni tests) seemed to warrant further investigation.

Although there was little doubt that individuals recently immunized with sheep-brain anti-rabies vaccine would have some sheep-protein antibodies in their sera it would be necessary to check this. There was considerable delay before we were able to obtain material for such tests, and in the meantime we decided to try to obtain the required evidence from animal experiments.

Experimental

Rabbits

Rabbits are not suitable for immunization experiments with sheep-tissue vaccines. Friedemann (1917) had shown that rabbits possess a natural haemolysin for sheep's red blood cells, and by the use of suitable antigens it was found that other sheep antibodies, such as complement-fixing antibodies for sheep protein, could be demonstrated in the sera of a high proportion of normal rabbits. The presence of this natural complement-fixing antibody in the serum of normal rabbits suggested that further examination of this point might yield information of interest.

Hiles (1926) had noted that the sera of normal rabbits gave positive complement fixation with sheep hydatid fluid and assumed that the reaction was due to some anti-hydatid substance in the sera. We confirmed Hiles's observations, but when we tested a representative number of sera against ovine and bovine hydatid fluids† and a suspension of normal sheep's brain in parallel, we found that practically all the sera showed some degree of fixation of complement with the sheep-brain antigen, but that only those sera with a relatively high anti-sheep titre gave fixation with an ovine hydatid fluid. Reactions with the bovine hydatid fluid were only occasionally seen. When complement fixation occurred with the sheep hydatid fluid the titre was significantly lower than that against the sheep-brain antigen; the occasional reactions with the bovine fluid were incomplete. Rabbit sera did not react with pure hydatid antigen, and absorption of a serum, giving fixation with both sheep-brain and sheep hydatid antigens, with massive doses of washed scolices from a fresh hydatid cyst failed to reduce the complement-fixation titre to either antigen. The titre of a serum containing true hydatid antibody was reduced to nearly zero in a parallel absorption test.

†Diluted in accordance with assay requirements.

It seemed clear, therefore, that the reactions observed by Hiles were due to the natural sheep antibody in the rabbits' sera fixing complement with the sheep protein in the ovine hydatid fluid and not to hydatid antibody. The reactions we obtained with the bovine fluid were not unexpected, since Schiff (1937) showed that there was a partial antigenic relationship between ovine and bovine tissue extracts. The explanation for the difference in the complement-fixation titres obtained with the two types of sheep antigens is discussed below.

Guinea-pigs

Natural sheep antibodies are not found in the sera of guinea-pigs, and our previous experience in the preparation of the standard hydatid antibody suggested that the animals would be suitable for immunization with a normal sheep-tissue vaccine. After pre-inoculation test-bleeds, two guinea-pigs were given weekly intraperitoneal injections of a 5% saline suspension of fresh sheep brain which had previously been well washed to remove as much blood as possible.

The antibody response was not so good as had been expected, and the final serum pool had a homologous titre of little more than 1 in 8, but the fixation was good and the end-point clear-cut. The serum, however, showed no complement fixation with sheep hydatid fluid. It would appear that the concentration of sheep protein in this fluid, as diluted for the hydatid C.F.T. by the standard method, was too low to detect the relatively low-titre sheep antibody. (We have found that when the titre of natural sheep antibody in rabbit sera had a level of 1 in 32 or more we obtained fixation with the hydatid fluid in a serum dilution of about 1 in 8.)

In order to test the possibility of multiple Casoni tests influencing antibody production in immune animals the following experiment was done. One month after bleeding the immunized guinea-pigs, when their sheep antibody level was beginning to fall, they were given spaced doses of 0.1 ml. of sheep hydatid fluid intradermally. There were no tissue reactions to the injections, but the anti-sheep titre increased by a full step to 1 in 16. This level was apparently still too low, because no reaction was obtained with the hydatid antigen. It was not feasible, unfortunately, to continue this experiment.

Human Volunteers

"Anti-rabies treatment" with the Semple type of vaccine involves a long course of daily injections of a phenolized suspension of infected sheep brain, and it seemed reasonable to expect a long-lasting "basal immunity" to sheep protein in individuals who had received this form of treatment. One of us (H.J.B.) and four colleagues, all of whom had received one or more courses of the Semple vaccine many years previously, were given intradermal injections of sheep hydatid fluid in doses of 0.1 ml. at intervals of 7–10 days to ascertain (1) if previous exposure to sheep protein influenced the response in the local reaction to the intradermal injections, and (2) whether these injections gave rise to sheep antibody response, as in the case of the guinea-pigs. The results of this experiment are summarized in Table I.

It will be noted that three of the five subjects developed significant complement-fixing antibody to sheep protein as a result of the intradermal injections of the sheep hydatid fluid.

The result of the final C.F.T. in subject P. with the hydatid antigen is of very doubtful significance. The test was twice repeated, and on each occasion there was merely delayed haemolysis in the lowest dilution (1 in 2); higher dilutions were completely negative. Further investigations of H.J.B.'s serum were made, and these are reported below.

With the exception of H.J.B. the only one showing any local reaction to the injections was W., in whom the first injection was followed by a delayed mild erythema while the second produced a slightly more severe reaction of the same type, but both were trivial in nature and quickly faded. H.J.B., on the other hand, was quite severely affected. He had a strong familial and personal history of allergic manifestations, but the reactions to the intradermal injections were much greater than had been anticipated. The first injection into the left forearm produced little or no reaction; but the second, after a week's interval, into the same forearm, although there was no immediate reaction, was followed after a delay of five to six hours by an intense erythema spreading from the site of the injection to an area of about 15 cm. across. After a week, when this reaction had almost faded, the third injection was given into the opposite forearm. The injection weal quickly spread to nearly 10 mm., but without pseudopodia. Within four hours an acute erythema was rapidly extending from the site of injection and soon covered the whole of the forearm, which became markedly oedematous and heavy. There were also mild general symptoms. At the same time the other arm flared up at the site of the second injection with a more intense reaction than previously noted. It was more than three weeks before the arms resumed their normal appearance. Blood taken shortly after this and examined with different antigens gave the following results in the C.F.T.:

Standardized sheep hydatid antigen ..	Positive (titre 1 in 16)
*Worm scolices antigen (specific hydatid)	Positive (titre 1 in 16)
†Beef hydatid fluid	Weak positive (titre 1 in 2)
Normal sheep-brain antigen	Positive (titre 1 in 16)

A mass of washed scolices was added to about 2 ml. of H.J.B.'s serum, and after one hour on the bench was allowed to act at 4° C. overnight. The complement-fixing antibody titre with sheep hydatid antigen was reduced by this procedure from 1 in 16 to just under 1 in 4, but the titre to the sheep-brain antigen remained unchanged at 1 in 16. The

TABLE I.—*Effect of Multiple Casoni Tests with Sheep Fluid on the Complement-fixation Reaction in Individuals Previously Sensitized Against Sheep Protein*

Volunteer and Date of Last Anti-rabies Injection	Reaction to Casoni Test	Time of Test Bleeds Related to Casoni Tests	Complement-fixation Reaction	
			Hydatid Antigen	Sheep-protein Antigen
W. (1927)	±	Before	Negative	Negative
	+	After 1st dose	,,	±(2)
		,, 2nd ,,	,,	++(4)
L. (1938)	Negative	Before	,,	Negative
	,,	After 1st dose	,,	,,
		,, 2nd ,,	,,	,,
F. (1938)	Negative	Before	,,	,,
	,,	After 1st dose	,,	,,
		,, 2nd ,,	,,	,,
P. (1939)	Negative	Before	,,	,,
	,,	After 1st dose	,,	+(2)
		,, 2nd ,,	?	++(4)
H.J.B.* (1939)	Negative	Before	Not done	Not done
	++	After 1st dose		
	+++	,, 2nd ,,		
		,, 3rd ,,	++(16)	++(16)

Figures in parentheses = reciprocals of complement-fixation antibody titres.
Controls: Individuals not previously sensitized with sheep vaccine gave completely negative results after two weekly intradermal injections of sheep hydatid fluid.
* H.J.B. was not test-bled before he received his first intradermal injection, but the fact that his sheep protein and hydatid antibody levels both fell gradually to zero within the following 12 months indicated that, prior to the experiment, his serum also did not contain detectable antibodies to either antigen. The results have therefore been incorporated in a single table.

*Fresh scolices from hydatid cyst fluid, after thorough washing to remove host protein, were ground up in saline and the supernatant assayed against standard antibody. In the optimal dilution this antigen gave standard fixation with standard antibody at the correct titre and failed to show any cross-reaction with sheep-protein antibody; it was assumed to be specific for hydatid antibody.

†This beef hydatid fluid, when examined in parallel with the standardized sheep hydatid antigen in a chessboard test against the standard hydatid antibody, proved to be a weak antigen; at its optimal dilution there was standard fixation (++) at 1 in 32 instead of 1 in 64, and, moreover, the optimal dilution was only 1 in 5, whereas the sheep hydatid antigen had an optimal dilution of 1 in 16, which gave standard fixation at a titre of 1 in 64. Weak antigens are notoriously unreliable in immunity reactions, and there seems to be little doubt that the titre recorded in the test is too low.

sheep-brain antibody level was not reduced by absorption with guinea-pig kidney tissue, and absorption with sheep brain or sheep or ox red blood cells made the serum markedly anticomplementary. In spite of these difficulties it seems clear that H.J.B.'s serum contained two distinct antibody fractions—one specific against the hydatid antigen and the other against sheep protein.

Inoculation of Individuals with Anti-rabies Vaccine

Many unsuccessful attempts had been made to obtain samples of serum before and shortly after the completion of a course of injections of sheep-brain anti-rabies vaccine, but we were eventually able to examine a number of sera from patients in Hong Kong who had just completed a course of injections of goat-brain anti-rabies vaccine. Unfortunately the majority of the sera proved to be anticomplementary, but three sera were free from this effect, and the results of the C.F.T.s with these sera and hydatid antigens of ovine origin and a normal sheep-brain antigen are set out in Table II.

TABLE II.—*Effect of Recent Sheep-protein Immunization on Complement Fixation with Different Antigens*

Serum	Complement-fixation Reaction—Serum Dilution Reciprocals													
	Sheep Hydatid Antigen							Normal Sheep-brain Antigen						
	2	4	8	16	32	64	128	2	4	8	16	32	64	128
Anti-rabies HK 4	+	+	±	−	−	−	−	+++	+++	+++	++	+	±	−
,, HK 5	±	±	−	−	−	−	−	+	+	±	±	−	−	−
,, HK 7	+++	+++	+++	+	±	−	−	+++	+++	+++	+++	++	+	−
Standard hydatid antibody ..	+++	+++	+++	+++	+++	++	±	−	−	−	−	−	−	−
,, sheep ,, ..	−	−	−	−	−	−	−	+++	+++	+++	+	−	−	−
Normal human serum ..	−	−	−	−	−	−	−	−	−	−	−	−	−	−

It is clear from this table that the sera of recently immunized individuals (with sheep- or goat-brain anti-rabies vaccines) may give positive complement-fixation reactions with a sheep hydatid antigen. Individual response to those inoculations, as judged by the results with the three specimens available, appears to vary considerably, and, as in the cases of the rabbit natural antibody, it seems that it is only when the sheep-protein antibody titre is high enough that there will be any demonstrable antibody titre with the sheep hydatid antigen.

Discussion

Although the hydatid C.F.T., employing sheep hydatid fluid as the antigen, has long been regarded as a specific test it is obvious that an antigen containing a factor derived from the host's tissues in addition to the specific component is liable to yield anomalous results under certain conditions. In view of the very large numbers of individuals (living in areas where rabies is endemic and hydatid disease not a great rarity) who have received the Semple type of anti-rabies vaccine it is surprising that results of the sort reported here have not been previously encountered. At least we have been unable to find any published records, although Kellaway and Fairley (1932) mentioned the possibility of previous sheep-protein sensitization interfering with the interpretation of the Casoni test but did not mention this complication in relation to the C.F.T. In spite of the fact that the test was introduced over 50 years ago (Ghedini, 1906) it seems likely that it is not employed very widely, otherwise the hazard would have been reported earlier.

From the limited evidence available induced sheep-protein antibody appears to fall to almost zero within 12 months, so that, provided no boosting injections are given in the interval, anti-rabies vaccine given a year or more previously would probably not complicate the interpretation of a hydatid C.F.T.

It is possible to prepare an almost completely specific hydatid antigen from fresh scolices as described briefly above, but the difficulty of obtaining suitable material in this country has restricted its use to experimental testing only, and in common with most other workers in this field we have relied on sheep fluids. By examining fluids from separate cysts it has been possible to select those very rich in antigen which can be accurately standardized and give reproducible results over periods of years. Their working dilution is generally 1 in 16 or 1 in 32: these high dilutions greatly reduce the chances of non-specific reactions. In our experience bovine fluids have not been so rich in hydatid antigen, and the results of the C.F.T. employing this antigen have been much less satisfactory.

When a rabbit serum containing high-titre natural sheep antibody was tested against sheep hydatid fluid and normal sheep-brain suspension in parallel it was found that the titre with the former was much less than with the latter. The sheep hydatid fluid had been assayed against the standard hydatid antibody for the hydatid C.F.T., and because of its richness in hydatid antibody it required dilution well beyond the optimum for maximum sensitivity for the measurement of sheep-protein antibody. The hydatid fluid, therefore, will react only at higher concentrations of sheep-protein antibody and fail altogether when the total amount is below a certain level. This is well illustrated in the case of HK 4 (see Table II, top line) and of the guinea-pig anti-sheep serum.

The serological results in the case of H.J.B. are clearly in a different category. The very intense tissue reactions to the intradermal injections of the sheep hydatid fluid in a sensitized allergic subject resulted in the development of true antibodies to both the hydatid and sheep factors to approximately the same titre. It is possible that Graña's (1944) observation that the injection of hydatid fluid into patients with hydatid disease resulted in the development of sheep antibodies, if the injections gave rise to tissue reactions, is an example of the same order but with a reversal of the sensitizing agent.

Summary

The occurrence of false-positive reactions in the routine hydatid complement-fixation test is described as a rare event, and evidence is produced to show how the use of an antigen containing both the host protein and the specific hydatid fractions can confuse the issue in patients previously immunized with vaccines containing the same or related host protein.

We owe thanks to Dr. P. A. Clearkin and Mr. N. S. Schizas, of Cyprus, for their kindness in sending us generous supplies of hydatid fluids; to Dr. E. F. Duck and Mr. A. E. P. Grimmo, of the Pathological Institute, Caine Road, Hong Kong, for the sera from patients immunized with goat-brain anti-rabies vaccines; to our colleagues who volunteered for the human experiments; and to Dr. Naomi Datta for her help with the animal experiments, many of which have not been described here.

REFERENCES

Bensted, H. J., and Atkinson, J. D. (1953). *Lancet*, **1**, 265.
Friedemann, U. (1917). *Biochem. Z.*, **80**, 333.
Ghedini, G. (1906). *Gazz. Osp. Clin.*, **27**, 166.
Graña, A. (1944). *J. Immunol.*, **48**, 203.
Hiles, I. (1926). *J. Helminth.*, **4**, 143.
Kellaway, C. H., and Fairley, K. D. (1932). *Med. J. Aust.*, **1**, 340.
Schiff, F. (1937). *J. Immunol.*, **33**, 305.

A RAPID TEST FOR THE PRESENCE OF INCREASED COLD AGGLUTININS

BY

D. H. GARROW, B.M., M.R.C.P.

Senior Paediatric Registrar, St. George's Hospital and Victoria Hospital for Children, Tite Street, London

Increased cold agglutinins are most commonly found in patients with virus pneumonia, but the usual method of estimating them, by titration, is time-consuming, and delay in obtaining the result limits the clinical value of the test. Since, however, cold haemagglutination is sometimes seen to occur almost immediately in the barrel of the syringe or along the side of the tube or pipette into which blood is drawn, it was thought possible that a test might be devised which would indicate rapidly whether or not cold agglutinins were present in excess. The purpose of this paper is to show that the rapid chilling of a simple mixture of whole blood and citrate provides a clinically reliable indication of the presence of increased cold agglutinins.

As long ago as 1903 Landsteiner made a study of the naturally occurring cold haemagglutinating antibodies which he had discovered to be present in various animals. He separated the serum of defibrinated blood from the red cells at 38° C. and added a small quantity of a suspension of autologous red cells in serum or saline to it on a slide, which was then placed in the refrigerator. He noted that, provided the proportion of plasma to red cell suspension was 10:1 or greater, the red cells formed large clumps, readily visible to the naked eye. When, however, the proportion of plasma to red-cell suspension was 5:1 or 5:2 no agglutination occurred.

My preliminary experiments were carried out with serum, plasma, and red blood cells, both undiluted and diluted in sodium chloride (0.9%) or sodium citrate (3.8%). These were mixed in different proportions and rapidly chilled. Undiluted specimens of serum or plasma from various children not suffering from virus pneumonia often produced agglutination of autologous cells provided that the suspensions were not too dense. When strong suspensions of red cells were used, however, agglutination regularly failed to appear. The serum or plasma from patients with virus pneumonia, in striking contrast, produced marked agglutination even of concentrated red-cell suspensions. Moreover, the stronger the concentration of red cells the more rapidly did they agglutinate and the larger were the clumps formed.

Dilutions of whole blood were then made in saline and citrate, and the effect of rapid chilling was observed. Sodium citrate was preferred to saline, since it prevented clotting and was incidentally found to enhance agglutination.

The most satisfactory and clear-cut results were obtained with a mixture of whole blood and citrate in equal amounts. Such a mixture constitutes approximately a 20% suspension of red cells in a 1:3 dilution of plasma. Under these circumstances the amount of cold antibody present in the blood of healthy persons produced no agglutination on chilling, whereas the red cells in the blood of patients with virus pneumonia rapidly formed coarse clumps. In whole blood, since in a given sample the ratio of red cells to antibody is constant however it may subsequently be diluted, it might be expected that the relative amounts of blood and citrate could be varied considerably without affecting the result. This proved to be the case within wide limits, but a gross excess of citrate to blood produced a relatively finer pattern of agglutination; a similar excess of blood to citrate resulted in a sticky mixture difficult to read.

Dilutions were initially made on slides which were placed in the refrigerator for varying periods. Mixtures, however, are easier to handle in test-tubes, and tests showed that a small volume (0.4 ml.) of fluid in a Wassermann tube surrounded by ice crystals could be brought to a temperature of 0–4°C. within 15 seconds.

The Test

The following procedure has finally been adopted as a rapid test for the presence of increased cold agglutinins.

Approximately 0.2 ml. of blood, obtained from a finger or ear prick, is allowed to run into approximately 0.2 ml. of 3.8% trisodium citrate in a thin-walled glass Wassermann tube (60 by 7 mm.). The corked tube is rapidly chilled by rubbing it on the cold tray of a refrigerator so as to cover the outside of the tube with ice crystals and is left for about 15 seconds on its side in the tray. The tube is then removed, holding it at the corked end to avoid warming, and is slowly rotated so that the blood–citrate mixture runs gently over the chilled glass surface, to which ice crystals still adhere. The presence of coarse floccular agglutination is recorded as "positive." No agglutination, or the presence of a fine granularity, is recorded as "negative" (see Fig. 1).

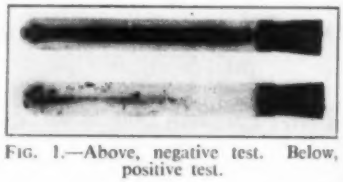


FIG. 1.—Above, negative test. Below, positive test.

The tube is then warmed in the hand for a few seconds and re-examined to confirm that all agglutination has disappeared. If a negative result is obtained there is no point in repeating refrigeration, since in no instance has the delayed development of agglutination been encountered. On the contrary, floccular agglutination either appears with remarkable rapidity or not at all.

Relation of Test to Cold Agglutinin Titre

A satisfactory correlation having been demonstrated between a positive rapid test and the subsequent detection of an increased titre of cold agglutinins in a number of patients with virus penumonia, a systematic investigation was carried out on 92 specimens of serum to determine the range of titre associated with positive and negative results respectively.

Method of Titration.—Venous blood was obtained from the patient on the same day as the screening test was performed, and was allowed to clot at room temperature. Serum was separated after incubating the clotted blood for one hour at 37° C. Samples of serum were kept frozen solid until tested, within a fortnight of bleeding. Doubling dilutions were made in plastic trays, using 0.2-ml. volumes of serum in saline (isotonic sodium chloride). To each dilution was added 0.2 ml. of a 1% suspension of group O red cells freshly prepared and washed three times in saline. The same donor (D. H. G.) was used for all estimations. The results were read after overnight refrigeration. The tray was gently tapped to suspend the red cells, and the titre recorded as the reciprocal of the final dilution of serum showing definite agglutination readily visible to the naked eye, without special lighting. Agglutination which could be detected only with the hand lens or with difficulty was ignored. Although the impression had been formed that there was a positive correlation between the height of the

cold agglutinin titre and the size of the red-cell aggregates in the screening tests, no attempt was made to grade the latter, which were simply recorded as either positive or negative.

Usually the result was unequivocal, but borderline examples were occasionally encountered. As many as possible of these were included to determine the degree of overlap. The results are shown in Fig. 2. Screening tests

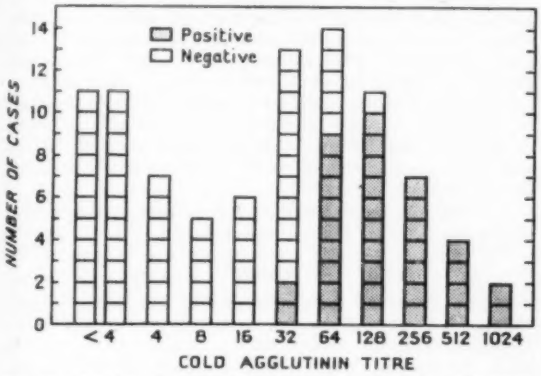


FIG. 2.—Results of rapid test compared with titre of serum obtained on the same day.

were usually negative at a titre of 32 and usually positive at a titre of 64. No negative result was recorded at a titre of 256 or higher, and no positive result at a titre of 16 or less.

Diagnostic Value of Test

This test has been found to be a convenient way of following the appearance and subsequent disappearance of increased cold agglutinins in children with virus pneumonia. With rare exceptions a positive result was found only in association with this condition. The accompanying Table

Rapid Test Results

Diagnosis	Positive	Negative	Total
Virus pneumonia or bronchitis	56	3	59*
Bacterial or non-specific pneumonia or bronchitis	0	226	226†
Bronchiectasis or asthma	0	26	26
Pulmonary tuberculosis	0	17	17
Measles	1	19	20
Infective hepatitis	0	7	7
Severe anaemia and leukaemia	0	9	9
Nephritis	0	15	15
Rheumatic fever	1	13	14
Other miscellaneous diseases	1	144	145
Healthy children and adults	0	45	45
Total	59	524	583

* Including 7 adults. † Including 59 adults.

shows the results of tests performed on 583 children and adults. Of the 59 children or adults positive on one or more occasions, 56 were considered to have virus pneumonia or bronchitis. In only three children was supporting evidence for a diagnosis of virus pneumonia not obtained—one convalescent from measles, one with rheumatic fever, and one infant admitted because of failure to thrive. In each of these the test was only weakly positive.

On the other hand, 524 children or adults failed to show a positive reaction when tested on one or more occasions. From the table it can be seen that a large proportion of these had pneumonia or bronchitis, usually of undetermined aetiology. Many acute infections of the upper respiratory tract have also been included under "other miscellaneous diseases," as have examples of other virus infections such as primary herpes simplex stomatitis, vaccinia, varicella, and infectious mononucleosis. Also included under this heading are examples of whooping-cough, fibrocystic disease of the pancreas, and gastro-enteritis.

These findings suggest that a positive rapid test is of value in the diagnosis of virus pneumonia.

Discussion

Clough and Richter (1918) noticed increased cold agglutinins when they attempted to perform a routine red-blood-cell count upon a patient almost certainly suffering from virus pneumonia. Upon drawing the blood into the diluting pipette it was found that the red blood cells became agglutinated so markedly that clumps were visible macroscopically as well as microscopically. They proceeded to carry out titrations of the patient's serum and to make a detailed study of cold agglutinins, but did not appreciate their clinical significance. The frequent association of the phenomenon with virus pneumonia was first recognized by Peterson, Ham, and Finland (1943) and by Turner (1943). These reports were soon confirmed and led to the adoption of cold-agglutinin titration as a routine laboratory procedure. The importance of a carefully standardized technique, however, was not at first appreciated. Each stage is a possible source of error. The temperature at which the serum is separated, the time it is stored, the strength of the red-cell suspension, the age of the cells, the donor from whom they are obtained, and the method of reading and expressing the end-point may all influence the result to a great extent. The rapid test avoids these sources of error, and has the additional advantages of being readily repeatable.

There is, however, another aspect of the problem to be considered. Even when accurately determined, titre as the sole measure of cold-haemagglutinating antibody has certain limitations. It takes no account of avidity, the term being used here as expressing the strength of red-cell adherence produced by a serum at a given dilution, as shown by the coarseness of the red-cell aggregates and their resistance to dispersal by agitation. Two sera may be defined as differing markedly in potency because of differences in avidity. Because of this, Crookston, Dacie, and Rossi (1956) used arbitrary "units" to compare the sensitivity to cold antibody of different red cells, allotting a score for the intensity of agglutination at each dilution and multiplying the sum of the scores by the number of tubes showing agglutination.

Turner, Nisnewitz, Jackson, and Berney (1943) observed that there was a definite correlation between high avidity (the formation of a solid disk of cells) at low dilutions of serum and the height of the cold agglutinin titre. Finland and Barnes (1951) observed that fine granular agglutination might sometimes be present in a variety of clinical conditions to quite high titre, but they regarded a lower titre of value in the diagnosis of virus pneumonia provided that floccular agglutination was present at a titre of 1:10 or higher. Whether or not estimation of avidity should take precedence over titre in the diagnosis of virus pneumonia, the rapid test (which is a measure of avidity) is a convenient way of obtaining an indication of the amount of cold antibody present in the blood of a particular patient.

Various methods have been used by different workers to simplify the estimation of cold agglutinins. Shone and Passmore (1943) observed in a number of patients with virus pneumonia that their blood rapidly formed clumps of red cells when a drop was left upon a slide at room temperature. They did not study the critical temperature at which this change occurred. Young (1946) used a presumptive test which, however, involved the separation of serum, the addition of a dilute suspension of red cells, and refrigeration in the usual way. Chang and Hou (1948) described a method whereby doubling dilutions of serum were made on a specially ground slide which could be examined directly under the microscope; agglutination was usually complete within two hours. Trönnberg (1950) described a simplified method of titration, using citrated plasma and a dilute suspension of patients' unwashed cells. None of these methods, however, is as simple and rapid as the test here described.

Summary

A simple and rapid screening test for the presence of increased cold agglutinins is described. A mixture of whole blood and sodium citrate in equal parts in a small

test-tube is chilled; under these circumstances an excess of cold antibody causes the red cells to agglutinate almost immediately, whereas a normal amount fails to produce agglutination even after prolonged chilling.

Tests were recorded as positive or negative respectively, and were compared with titrations in 92 instances; they were usually positive at a titre of 64, always negative at 16 or lower, and always positive at 256 or higher.

The diagnostic value of the test was assessed in 583 children and adults suffering from a variety of conditions. With 3 exceptions a rapid screening test was positive only in association with virus pneumonia.

The test has several advantages over titration as a method for estimating cold agglutinins: (1) Venepuncture is unnecessary; (2) no special equipment is required; (3) it is a measure of the avidity of agglutination as well as of the titre; (4) it takes less than a minute to perform; (5) the same sample of blood can be tested as often as desired. It has been found of considerable value in the diagnosis of virus pneumonia and could be performed as readily in general practice as in hospital.

I thank Dr. C. Pinckney, Dr. Ursula James, and Dr. C. W. Kesson for permission to investigate their patients, and Dr. G. F. R. Hilson for his help and encouragement.

REFERENCES

Chang, N. C., and Hou, T. C. (1948). *J. Lab. clin. Med.*, **33**, 1447.
Clough, M. C., and Richter, I. M. (1918). *Bull. Johns Hopk. Hosp.*, **29**, 86.
Crookston, J. H., Dacie, J. V., and Rossi, V. (1956). *Brit. J. Haemat.*, **2**, 321.
Finland, M., and Barnes, M. W. (1951). *Amer. J. med. Sci.*, **221**, 152.
Landsteiner, K. (1903). *Münch. med. Wschr.*, **50**, 1812.
Peterson, O. L., Ham, T. H., and Finland, M. (1943). *Science*, **97**, 167.
Shone, S., and Passmore, R. (1943). *Lancet*, **2**, 445.
Trönnberg, G. (1950). *Scand. J. clin. Lab. Invest.*, **2**, 74.
Turner, J. C. (1943). *Nature (Lond.)*, **151**, 419.
—— Nisnewitz, S., Jackson, E. B., and Berney, R. (1943). *Lancet*, **1**, 765.
Young, L. E. (1946). *Amer. J. med. Sci.*, **211**, 23.

PRIMIDONE TREATMENT OF ATHETOSIS IN CHILDREN

BY

JOHN LORBER, M.D., M.R.C.P.

Reader in Child Health, University of Sheffield

Drugs have so far played little part in the treatment of congenital athetosis, and many that appeared promising on paper have proved disappointing in practice. One such drug was benzhexol ("artane"), which was shown to be not only useless but dangerous in a strictly controlled therapeutic trial, using the "double blind" method (Lorber, 1955).

As a result of a statement by Plum (1957) that small doses of primidone had helped 18 out of 31 athetoid children, it was decided to conduct a pilot trial with primidone in a selected group of athetoid children, and to follow this by a full-scale controlled trial if the results justified it.

Material and Methods

For the pilot trial nine patients were selected. All had already attended the out-patient clinic and physiotherapy department for at least four years, so that their abilities and the range of fluctuations in their condition were well known. With one exception all were educable and attended various special schools. Eight were between 6 and 12 years of age and one was a youth of 18. They had a variety of types of athetosis, which in six of them was the result of kernicterus. All had been included in the previous trial with benzhexol.

Primidone ("mysoline") was dispensed as an emulsion. The initial dose was 25 mg. twice daily, and was raised to 75 mg. daily if there was no therapeutic response or evidence of toxicity. The maximum duration of treatment was three months. A placebo, with similar taste and appearance, was then given to those children whose parents considered that improvement had occurred. None of the children had had primidone treatment before the present trial.

The parents were informed that a new drug was to be given to their children and that the drug was known to be helpful in a proportion of children like their own. They were not informed when the drug was changed to a placebo. They were asked to note with particular care any new features, good or bad, during the administration of the drug. At the same time the school-teachers were also informed of the new treatment through the school medical officers and were asked to report on the condition of the children during the trial.

The children were observed for a further period after discontinuation of the drug and placebo.

Results

A full course of three months was completed in eight children. Treatment was interrupted after five days in one hypotonic athetoid child aged 10, because he became so weak and unsteady that he could no longer stand. According to his mother's description "his legs went like jelly." His deterioration was also noted by his school-teacher. On the stopping of treatment he quickly returned to his previous condition. The response of this child to very small doses of benzhexol had been very similar four years earlier.

A second child, aged 6, was a little less steady and became drowsy during treatment. His teacher reported that he was "there in body, but not in spirit" during this period. He, too, regained his previous condition immediately at the end of the course of treatment. Five children showed no response whatever either subjectively or objectively.

Finally, the mothers reported appreciable improvement in two children on primidone treatment. They had more initiative, and attempted tasks with some measure of success which they had never tried before, and became generally steadier. Objectively there was no detectable change in their condition on neurological examination. They were then given a placebo, and they retained this improvement not only while they took a placebo but also subsequently when all drug treatment was discontinued.

Discussion

The results of this pilot study were so disappointing that it was not felt that a trial on a larger scale would be worth while. The doses of primidone were of the same order as those used by Plum (1957). A further increase in the dose was thought to be dangerous in view of the sensitivity of athetoid patients to certain drugs—for example, benzhexol—and of the toxic symptoms observed in two patients during this trial with small doses of primidone.

Summary and Conclusions

Primidone, in doses of 50 to 75 mg. daily, was used in the treatment of nine patients with congenital athetosis. In five no change was detected. Two showed subjective improvement while on the drug, and this improvement was maintained while receiving a placebo and after drug and placebo had been discontinued. In two children there were toxic symptoms: hypotonia and weakness in one and drowsiness in the other. It is concluded that primidone, in the dosage used in this trial, is of no benefit to children with athetosis.

I thank Professor R. S. Illingworth for his criticism and Dr. R. R. Gordon for permission to study and treat two of his patients.

REFERENCES

Lorber, J. (1955). *Arch. Dis. Childh.*, **30**, 251.
Plum, P. (1957). *Ibid.*, **32**, 365.

Medical Memoranda

Sulphamethoxypyridazine in Dermatitis Herpetiformis

Dermatitis herpetiformis is an uncommon skin disease. In the three-year period 1954–6, out of a total of 26,581 new patients seen at dermatological clinics in Northern Ireland, there were 68 cases of this disease.

In Northern Ireland, skin clinics are held in the main industrial centres and in some provincial centres which serve large rural areas. This disease has always appeared to be much more common in these rural areas. Of the totals given above, the city had 27 cases of the disease out of 17,951 new patients (0.15%), whilst rural clinics had 41 cases out of a total of 8,630 patients (0.47%).

Dermatitis herpetiformis is extremely chronic and causes severe itching, but rarely interferes seriously with general health. The cause is unknown, and, while it may show remissions or spontaneous cure, treatment to date will at best only control it. Though it is comparatively rare, patients are constantly attending skin clinics for control of treatment.

The usual remedies include sulphapyridine, arsenic, and dapsone. These all control the disease to a greater or less extent in different patients, but they also have their limitations, owing to toxicity or the danger of sequelae—for example, arsenical keratoses, and cancers.

Sulphamethoxypyridazine, a new sulphonamide, was tried as a possible control for this disease. Apparently all the therapeutic sulphonamides have a rather similar chemical structure. The formula of sulphamethoxypyridazine is no more similar to that of sulphapyridine than it is to sulphadiazine, and would not demonstrate a common chemical cause for their respective effects in dermatitis herpetiformis.

The following cases were treated with sulphamethoxypyridazine, supplied as "lederkyn" tablets.

CASE REPORTS

Case 1.—Man aged 36. Duration five years. Controlled for three years on sulphapyridine. On sulphamethoxypyridazine since beginning of June, 1957. Cleared completely on 1 tablet t.i.d. after four weeks, and remained clear until mid-August. Then became itchy, with a few vesicles on the buttocks, and put on 1 tablet q.i.d. Has remained well on this dosage. Was reduced to 1 tablet t.i.d., but itch recurred. Remained on 1 tablet q.i.d. No toxic symptoms.

Case 2.—Man aged 35. Duration 15 years. Treated previously with dapsone, sulphapyridine, and arsenic. Did well on sulphapyridine, but became sick and had to stop them on several occasions. Could take dapsone for only short periods. Put on sulphamethoxypyridazine at the end of March, 1957. On 1 tablet t.i.d. for four weeks—was then free of itch and clear of spots. Has been on this dosage ever since with no upset. Had one flare-up of rash in September. This coincided with overwork and stress due to the fact that his employer was ill and he was doing both jobs. Rash subsided when employer returned.

Case 3.—Married woman aged 23. Duration one year. Previously treated with arsenic without effect. On sulphamethoxypyridazine from beginning of May, 1957. Controlled within two weeks on 1 tablet t.i.d. One week after starting tablets, marked nausea and anorexia. Next day, pains in neck and limbs, and generalized rash. Also had generalized glands, no blood changes; diagnosed as rubella. Clear in two days. Since July 25 on 1 tablet b.i.d. No spots and no itch. Since November 4 on 1 tablet daily. Off all treatment for past six weeks without any recurrence.

Case 4.—Man aged 35. Duration seven years. Previous treatment included sulphapyridine, liquor arsenicalis, and injections of antitoxin. Was treated twice as an in-patient and had a period of remission for almost a year. Rash very active in May, 1957, and was then put on sulphamethoxypyridazine, 1 tablet t.i.d. Rash and symptoms disappeared in one week, and he has remained completely clear since. Since July 19 he has been on 1 tablet b.i.d. No toxic symptoms.

Case 5.—Man aged 50. Duration 10 years. Previous treatment included antihistamines, arsenic, and sulphapyridine. Started sulphamethoxypyridazine 1 tablet t.i.d. on June 18, 1957. Was completely controlled in one week. Since August 28 on 1 tablet b.i.d. In mid-September had a peculiar upset consisting of dizziness, headaches, and inability to concentrate. This stopped when he came off the tablets, but recurred when he was put on them again. If he took only 1 tablet in the morning he had no symptoms, but some rash on the forearms. Later put on 1 tablet in the morning and after lunch, along with alkali each time. No upset. Skin remained well.

Case 6.—Married woman aged 45. Duration four years. Previous treatment included antihistamines, sedative, arsenic, none of which had any effect. On sulphamethoxypyridazine, 1 tablet t.i.d. from June 10, 1957. Very well controlled. Later on 1 tablet b.i.d. No toxic symptoms.

Case 7.—Man aged 54. Duration two years. Bullous type simulating pemphigus. Moderate response to liquor arsenicalis. No response to delta-cortisone. Admitted to hospital on September 17, 1956, with generalized bullous eruption and severe irritation. Liquor arsenicalis without effect. Improved temporarily on sulphapyridine but then relapsed. Then put on sulphamethoxypyridazine 1 tablet t.i.d., and increased to 1 tablet q.i.d. Remained well on this until we were temporarily out of tablets. Rash immediately recurred in a severe bullous form and he was readmitted. Itch was extreme. He was immediately started again on sulphamethoxypyridazine and was perfectly controlled on 1 tablet q.i.d. Has been no general upset whatever. Urine and blood examinations normal.

Case 8.—Married woman aged 57. Duration four years. Previous treatment included antihistamines and local applications. Started on sulphamethoxypyridazine on November 25, 1957. Clear of rash and symptoms in one week. Remained clear on 1 tablet b.i.d. for past three months.

Case 9.—Girl aged 11. Duration 18 months. On sulphamethoxypyridazine 1 tablet night and morning. Cleared in three to four days. Off tablets after three weeks. Occasional vesicle but no discomfort.

Case 10.—Male infant aged 12 months. Duration nine months. Treated with liquor arsenicalis without results. On sulphamethoxypyridazine ½ tablet night and morning. Cleared in one week. Off tablets after four weeks. Remained clear.

Case 11.—Boy aged 12. Duration nine years. Previous treatment was non-specific. Commenced sulphamethoxypyridazine on November 20, 1957, dosage ½ tablet t.i.d. Seen three weeks later, when rash was improved and symptoms were less acute. Dosage increased to 1 tablet b.i.d.—cleared in one week, and remained clear on above dosage for three weeks. Patient, at boarding-school, failed to obtain a renewal of tablets—pruritus returned within three to four days, and rash became quite active. Put on sulphamethoxypyridazine, 1 tablet b.i.d., and was rapidly clearing.

Case 12.—Boy aged 3½. Duration, onset at about 1 month. Put on liquor arsenicalis with marked improvement, but itch still present. Sulphamethoxypyridazine started on October 30, 1957, ½ tablet b.i.d. After two weeks rash almost clear, but still irritation at night. Dosage increased to ½ tablet t.i.d. Cleared in three to four days and remained clear. Off tablets for three weeks without any rash or any symptoms.

The drug was also tried in several cases of pemphigus and papular urticaria, but it did not produce any improvement. It has been used successfully in treating infective dermatitis, furunculosis, secondary infection in widespread eczemas, and in several cases of cystitis, cellulitis, and lymphangitis. For these, quite short courses were given with satisfactory results and no toxic symptoms were noted.

COMMENT

Twelve cases of dermatitis herpetiformis were treated with sulphamethoxypyridazine; one of them was of a severe bullous type and four were of the juvenile variety. Response in all these cases was most satisfactory. Several patients who had already received the usual controls for the disease declared spontaneously that the present treatment was the most pleasant and the most effective. One adult and three juvenile patients remained well after cessation of treatment.

In view of the variable course of the disease and the possibility of spontaneous remissions, it is extremely difficult to assess the results of treatment. All cases treated had an immediate response. In two cases treatment was interrupted when supplies were temporarily held up; in each case symptoms and rash promptly recurred and rapidly disappeared when treatment was restarted.

Local treatment consisted of mild soothing applications such as lotio plumbi and crem. calamin.; topical cortisone was not employed.

Toxic Symptoms.—Surprisingly, these were almost entirely absent. One patient developed what appeared to be genuine rubella and continued treatment without ill effect. Another patient developed a peculiar syndrome of dizziness and headache, but was able to continue the necessary dosage without further reactions. One patient has been taking four tablets daily for over one year without ill effect; blood counts and urinary tests reveal no abnormality.

I thank Dr. J. R. Wilson, of Messrs. Lederle Laboratories Ltd., for supplies of lederkyn, and Dr. Reginald Hall, my senior colleague at the hospital, for his constant interest and advice.

J. JEFFERSON, M.D.,
Dermatologist, Belfast City Hospital.

Culture of Trichomonas Vaginalis

Recently there has been an increased interest in the routine diagnosis of trichomonal vaginitis by culture rather than by direct examination. Media that are more easily prepared and are reliable have been described, giving bacteria-free cultures by the addition of antibiotics. American workers have claimed an increase up to 30% in positives by culture, and this method is often essential in diagnosis of the male carrier. Now that systemic treatments are being assessed, it is important that the most dependable methods should be used. The direct wet examination must be made shortly after collection, which precludes its use outside hospitals.

In the present investigation the value of Kupferberg's (1955) simplified "trypticase" serum (S.T.S.) medium (slightly modified) was explored (1) in increasing the number of positive results, and (2) as a transport medium.

MATERIALS AND METHODS

The patients were women with vulvovaginitis, and in some of them more than one specimen was taken during treatment. Swabs were collected by wooden applicators tipped with cotton-wool, or the discharge was pipetted off. In the hospital, specimens were brought straight to the laboratory, usually in warm saline. Swabs from outside were broken off into a bijou bottle of medium, and either reached the laboratory after some hours or were sent by post. On receipt specimens were examined in a warm preparation, and swabs in saline were transferred to S.T.S. medium. Drops were examined without coverslips, as these were found to force the organisms to the edges, thus delaying identification. Low power was used to pick up the motile trichomonads, and a higher power for checking. Cultures were made at 35 to 37° C., and were examined first after 24 hours and finally after five days, samples being taken from the bottom of the bottles, and, if negative, after centrifugation.

Kupferberg's S.T.S. Medium Modified.—Maltose, 1 g.; oxoid agar, 2 g.; trypticase (Baltimore Biological Laboratories), 20 g.; cysteine hydrochloride, 1.5 g.; distilled water to 1,000 ml. Autoclave at 10 lb. per sq. in. (0.7 kg./sq. cm.) for 10 minutes to dissolve. Adjust to *p*H 6 with N NaOH. Then add methylene blue 0.5%, 0.2 ml. Autoclave in 100-ml. bottles at 15 lb. per sq. in. (1 kg./sq. cm.) for 15 minutes. The medium is almost clear, is straw-coloured with a narrow blue zone at the top, and keeps three to four weeks. For use, tube in 5-ml. bijou bottles. Autoclave and add to each bottle 0.25 ml. of sterile serum containing 100,000 units of penicillin and 20 mg. of streptomycin per 5 ml. Discard after a week.

Minor modifications have been made from the original medium, as these facilitated its preparation and reduced the cost without decreasing its efficiency. *p*H adjustment of the serum was found to be unnecessary. The serum was taken from a pool of five bloods, as on two occasions when using individual sera from two patients no growth was obtained, even after *p*H adjustment. We can offer no explanation for this. Latterly tryptone ("oxoid") another pancreatic digest of casein, was used instead of trypticase, and the swabs were cultured in parallel.

RESULTS

The results of the examination of 405 specimens are shown in the Table. In no case was direct examination positive and culture negative. As an additional test of S.T.S. as a transport medium, duplicates of 20 of the swabs, known by direct examination to be positive, were placed in it and sent by post. All gave positive cultures on arrival.

Results in 405 Specimens

	No. of Swabs	No. of Positive		% Positive	% Increase on Positives Direct by Culture
		Direct Examinations	Cultures		
Hospital ..	319	86	95	29·8	10·5
Outlying ..	86	14	23	28	

Tryptone seemed to be a satisfactory substitute for trypticase, but further investigation is being made.

COMMENT

S.T.S. appears to be a highly reliable medium for the culture of *T. vaginalis*, and, slightly modified from Kupferberg's medium, is simple to prepare. We have found culture rather superior to direct examination. Kean and Day (1954), using S.T.S., claim a 31% increase on culture, and Perl *et al.* (1956) a 10% increase. Our figure of 10.5% agrees closely with the latter. Some workers have reported no advantage on culturing (McVay *et al.*, 1951; Bernstine and Rakoff, 1953).

As a transport medium S.T.S. appears to be of considerable value. Positives sent by post survive, and from patients outside the hospital the improvement on direct examination by culture was from 14 to 23. We realize that these figures are small, but they suggest that general practitioners and outlying clinics need not forgo a satisfactory laboratory diagnosis.

We thank Messrs. Ortho Pharmaceutical Ltd. for their generous supply of trypticase.

BARBARA M. WILKINSON, M.D.,
Pathologist, High Wycombe Hospital.
G. C. J. WILLIAMS, F.I.M.L.T.,
Chief Technologist, High Wycombe Hospital.

REFERENCES

Bernstine, J. B., and Rakoff, A. E. (1953). *Vaginal Infections, Infestations, and Discharges*. Blakiston, New York.
Kean, B. H., and Day, E. (1954). *Amer. J. Obstet.*, **68**, 1510.
Kupferberg, A. B. (1955). *Int. Rec. Med.*, **168**, 709.
McVay, L. V., Evans, L., and Sprunt, D. H. (1951). *Surg. Gynec. Obstet.*, **93**, 177.
Perl, G., Guttmacher, A. F., and Raggazzoni, H. (1956). *Obstet. and Gynec.*, **7**, 128.

Reviews

NEUROPATHOLOGY

Neuropathology. By J. G. Greenfield, M.D., F.R.C.P., LL.D., W. Blackwood, M.B., Ch.B., M.R.C.P.Ed., A. Meyer, M.D., W. H. McMenemey, M.A., D.M., F.R.C.P., and R. M. Norman, M.D., M.R.C.P., D.P.M. (Pp. 640+vi; illustrated. £5 5s.) London: Edward Arnold (Publishers) Ltd. 1958.

This handsome volume is a comprehensive and fully illustrated study of all aspects of neuropathology except neoplasms. Apart from his editorship Dr. Greenfield wrote seven of the 13 chapters. These deal with the various infective and demyelinating diseases; the system degenerations of the cerebellum, brain stem, and spinal cord; trauma; diseases of the peripheral nerves; lesions associated with diseases or malformations of the cranium and spinal column; as well as a more general and introductory chapter on the pathology of the nerve cells and neuroglia. In these important sections the mature experience of the author, based on a lifetime of routine work at the National Hospital, Queen Square, is crystallized. Posterity will be grateful for those more spacious years of his retirement that enabled Dr. Greenfield to undertake this labour, and our sole regret must be that he did not live to see and handle the product of his work.

Dr. Blackwood contributes a useful chapter on the vascular diseases in relation to the central nervous system. That by Dr. Norman deals with congenital malformations, the effects of birth injury, and neonatal diseases. This is an important and particularly well illustrated section, which is most welcome, from an acknowledged expert in this field. Professor Meyer has written on anoxia, intoxications, and metabolic diseases. He and Dr. McMenemey are separately responsible, too, for different aspects of the dementias, psychoses, and epilepsy. In general, Dr. Greenfield has been ably supported by his team, and the synthesis collectively reflects a high order of accuracy and scholarship in which the reader is brought up to date without loss of historical perspective. Each chapter has its own list of references and separate enumeration of the illustrations, but altogether there are about 500 of the latter. The text is laid out so readably and tersely that it is easy for reference as well as more extended study. It is safe to predict that the work will prove indispensable for all specialists in this field, whether pathologists or clinicians.

DOROTHY S. RUSSELL.

THE HISTORY OF PAIN

Anatomies of Pain. By J. D. Keele, M.D., F.R.C.P. (Pp. 260+x; illustrated. 27s. 6d.) Oxford: Blackwell Scientific Publications. 1957.

This is a valuable book whose title does not sufficiently indicate the wide field it covers. Pain has always been a serious problem, and in every age observers and thinkers have tried to locate the sensorium. Dr. Keele has read very widely and pondered deeply over the views held by the philosophers and scientists, and has produced a book which should appeal to the anatomist, the physiologist, the neurologist, the neurosurgeon, the psychologist, the medical historian, and even the metaphysician.

The first four chapters outline the views of Aristotle, Plato, Galen, Descartes, and others who sought for the sensorium commune. Chapter V gives an interesting account of the growth of knowledge of the spinothalamic tract. Then follows a masterpiece of compression (in places perhaps too compressed) in which, in 40 pages, the numerous discoveries made during the last 60 years are reviewed; in this the often conflicting experiments and theories have been, so far as is possible, reconciled. A reference to Jefferson's views on consciousness might well be added here. The last chapter, dealing with the structure of pain, will be of particular interest to the physician and psychologist. We cannot forbear one short quotation: "The witch-doctor who knew how to choose the appropriately worded curse or spell was the current specialist in the manipulation of conditioned reflexes. It is doubtful whether his techniques have been improved upon even in the societies of to-day." Dr. Keele considers that "reinterpretation of the old ideas in terms of new knowledge constitutes a fruitful form of scientific thought." His book is an excellent demonstration of that thesis.

ZACHARY COPE.

LEGAL LIABILITY OF DOCTORS

Malpractice Liability of Doctors and Hospitals (Common Law and Quebec Law). By William C. J. Meredith, Q.C. (Pp. 300+xv. $7.75.) Foreword by J. Gilbert Turner, M.D. Toronto: The Carswell Company Ltd. 1957.

I suppose reviewers may be forgiven if they sometimes skip. I did not skip this book. Mr. Meredith has not only achieved his aim of writing his law book on a special subject of general interest in language intelligible to laymen; he has written a law book which this lawyer found it difficult to put down.

After an opening chapter setting out the relation of doctor and patient as they still know it in Canada, unaffected by the impact of the National Health Service, Mr. Meredith deals chapter by chapter with those subjects which are of burning interest in principle as well as of daily practical importance: professional secrecy, with statutory privilege for the doctor in Quebec and some State jurisdictions in America in contrast to his nakedness at Common Law; the doctor as a witness, covering everything from what to do with a subpoena to how to set out a medical report in an accident case; malpractice in diagnosis and treatment, with a comforting reminder that the standard of care the law imposes is what his colleagues would expect of the ordinary competent practitioner in the circumstances; and the vicarious liability of hospitals, over which the Canadian courts have adopted the same approach as have the English courts since the decision in *Gold* v. *Essex County Council* in 1942.

Mr. Meredith includes chapters on civil courts and procedure, the assessment of damages, and criminal malpractice which afford interesting comparisons and contrasts with English practice. These chapters remind the English lawyer how fortunate he is to have one law only to deal with, and to be able to treat even Scots law as foreign. Apart from the statutory differences in the law in the "Common Law" provinces, the Quebec Civil Code does not stem from the Common Law at all.

"A BARRISTER."

TREATMENT OF ALCOHOLISM

Hospital Treatment of Alcoholism: A Comparative Experimental Study. By Robert S. Wallerstein, M.D., and Associates. Introduction by Karl A. Menninger, M.D. Menninger Clinic Monograph Series No. 11. (Pp. 212+xi. 42s.) London: Imago Publishing Company Ltd. 1957.

This book from the Menninger Clinic, U.S.A., examines the response of 178 persons treated in hospital for alcoholism. Three separate groups were given respectively "antabuse" (disulfiram), conditioned aversion treatment, and hypnotherapy, while a control group had only "a dynamically geared activities program in conjunction with group psychotherapy and with opportunities for individual psychotherapy." It was interesting to find that the patients given antabuse did by far the best of all four groups. Hypnosis came next, while both the conditioned aversion treatment and the control method helped only a quarter of the patients to whom they were applied.

In Britain a prerequisite of all treatments of alcoholism is thought to be the insistence on absolute teetotalism during and after treatment. But no attempt seems to have been made in this study to emphasize the dangers of taking "the first drink," which is considered so important here in the prevention of future relapses. It is significant, however, that the only group that did well was the one in which antabuse effectively stopped all drinking because of the severe physical

reactions that followed. The poor results reported with the conditioned aversion treatment were also probably due to the fact that the method was not used primarily as a means of indoctrinating and brain-washing the patient to a greater realization of the dangers of relapse whenever the first drink is again taken.

The book confirms what has been known for a long time—namely, that ordinary forms of psychotherapy and psychoanalytically orientated treatments work very poorly indeed in alcoholism. The only hopeful treatment seems to be to produce total abstinence by "fair means or foul." It does not seem to matter much whether this happens following sudden conversion at a revival meeting, or by attending meetings of Alcoholics Anonymous, or by the regular taking of antabuse, or by using the increased suggestibility that occurs both during conditioned aversion treatment and hypnotherapy to drive home the absolute necessity for total future abstinence. Any treatment which permits a return to moderate drinking is practically always doomed to failure, and that is why the statistics of this study may not be indicative of the full possibilities of the same treatments in other hands.

WILLIAM SARGANT.

THINKING

Thinking: An Experimental and Social Study. By Sir Frederic Bartlett, C.B.E., F.R.S. (Pp. 203. 18s.) London: George Allen and Unwin, Ltd. 1958.

To the many admirers of Sir Frederic Bartlett's earlier work this slim volume will come as a distinct disappointment. Its subtitle, "An Experimental and Social Study," suggests a type of content which is not in fact provided. The so-called "experimental" chapters can hardly be considered to be accounts of anything but the initial searchings which normally would precede a properly set-up and decisive experiment. All the author appears to have done has been to set up certain problems and to note what proportion of some ill-defined population, whose number is not even vouchsafed the reader, adopts one or other of several different alternative solutions. As regards the "social" side, this presumably refers to Sir Frederic's accounts of a number of historical instances of fruitful scientific thinking. These are in no way different from similar accounts written for similar purposes over the last 50 years, and it is difficult to see how they can be said to throw much light on the problem of thinking.

In his introductory chapter Sir Frederic gives his reasons for considering thinking to be similar in many ways to the type of skilled performance the experimental investigation of which has received so much attention in the Cambridge laboratories. Neither in this chapter nor in the following one is the case properly argued beyond noting a few superficial similarities; no decisive hypotheses are advanced and no deductions capable of being tested are derived. A further unsatisfactory feature of this book is its almost complete lack of any reference to the growing experimental literature on the subject, or even to recent American attempts at theory-making. In this book Sir Frederic has carried to its logical conclusion the well-known tendency of Cambridge psychologists to disregard contributions from outside the walls of their own laboratory; readers who are familiar with the experimental literature would not consider that the result has justified the effort. It is very much to be hoped that Sir Frederic will carry his researches to a more definitive conclusion and present them to us in a less restricted setting.

H. J. EYSENCK.

HORMONE RESEARCH

Recent Progress in Hormone Research. Volume XIII: Proceedings of the Laurentian Hormone Conference, 1956. Edited by Gregory Pincus. (Pp. 646+vi; illustrated. $12.80.) London: Academic Books Limited. 1957.

In these volumes, which appear annually, are reprinted the papers presented at the Laurentian Hormone Conferences together with much relevant discussion. They have now become an established part of endocrine literature. No attempt is made to cover the whole range of endocrinology, but certain significant fields have been selected for survey which are of general importance. Fourteen reviews are contained in the present volume, and each is a detailed study by an expert in his field.

Five main sections are included. The first covers aspects of neurohumoral and endocrine relationships. Under this head appear a valuable and concise review of present knowledge of serotonin; a detailed survey of the evidence for a mid-brain centre controlling hypothalamic and pituitary mechanisms; a study of the influence of the central nervous system on anterior pituitary function; and a detailed attempt to correlate rhythmic behaviour in psychiatric patients with hormonal rhythms, supported by experiments on rats. The second section is on transport of hormones in the circulation, and singles out for special study the interaction of thyroid hormones with protein in biological fluids and the binding of steroids and steroid conjugates to human plasma proteins. Both these are thorough and valuable reviews of their respective fields. The next section deals with some hormonal aspects of reproduction, including a study of implantation of ova in the rat and a review of the effects of three new synthetic progestins, such as 17-α-ethinyl-19-nortestosterone. Here also is a most interesting survey of the metabolism of progesterone as revealed by isotope labelling, with a review of the place of some long-acting steroids on reproduction. The fourth section, on hormones and metabolism, contains a review of the role of insulinase and insulinase inhibitors in diabetes mellitus and a very comprehensive survey of glucagon. In the final section, on hormones and stress, are discussed endocrine changes after anaesthesia, surgery, and trauma. There is also a study of the influence of the adrenal gland on gastric responses to stress.

It is clear, therefore, that a very wide range of subjects are discussed in some detail. The work is a most valuable reference volume for students of endocrinology, and should most certainly be present in the libraries they use.

C. L. COPE.

ENDOCRINOLOGY WITHOUT PICTURES

Introduction to Clinical Endocrinology. By A. Stuart Mason, M.A., M.D., B.Ch.(Cantab.), M.R.C.S.(Eng.), M.R.C.P. (Lond.) (Pp. 192+viii. 22s. 6d.) Oxford: Blackwell Scientific Publications. 1957.

This introduction to endocrinology gives information on the subject midway between the short accounts found in conventional textbooks of medicine and the voluminous descriptions contained in large reference books on endocrinology, of which latter there are quite a number. It is not entirely clear for whom such introductions are intended, but the student, practitioner, or physician who is interested in the subject but who cannot spare the time to read, or the money to buy, a fuller textbook will find in this comparatively small volume an admirably clear, accurate, and up-to-date account of clinical endocrinology in terms of applied physiology. The book is exceedingly readable and interesting and is written in excellent English. It is unusual for a work on this subject to contain no illustrations, which partly accounts for this book's very modest price. The author makes a virtue of necessity by claiming that the photographs of patients which usually illustrate such volumes show the end-point of disease, yet seldom portray early clinical signs and may actually give a visual bias against early diagnosis—an ingenious argument with some point to it. Less justifiable is the omission of any account of diabetes mellitus. It is odd that some pages should be devoted to the consideration of obesity and of spontaneous hypoglycaemia, and yet the most common and important endocrine disease in which so many ductless glands are involved should not be described. It is as though an author writing on what happens in *Hamlet* should omit all reference to the Prince of Denmark.

D. M. DUNLOP.

BRITISH MEDICAL JOURNAL
LONDON
SATURDAY JULY 26 1958

THE BIRMINGHAM MEETING

Every visitor to the Annual Meeting must have been stimulated by the vigorous growth of Birmingham University. If Britain needs more scientists and doctors then the bulldozers churning through the red earth of Edgbaston were outward and visible signs of the University's intention to train them. The same sense of purposeful energy that was behind all the building activity must have inspired the organizers of the Annual Meeting. Every item on the programme was designed to give the visitor the best possible value for the time he or she was prepared to spend at the meeting: no organizational detail which helped to that end was overlooked. For this excellent result the President, Professor A. P. Thomson, and his three chief lieutenants, Dr. J. W. Brown, Dr. A. C. Houghton, and Mr. A. Gourevitch, must be given the lion's share of the credit, for it was plain that they had the complex mechanism of the meeting at their fingertips. From the reception given by the Midland Branch on July 9 to the final meetings of the Sections on July 18 everything ran on the smoothest of lines.

The whole-hearted co-operation of the University was of course invaluable. Not only was the meeting admirably sited in the university buildings but the generosity of the university staff, from Dr. Robert Aitken, the vice-chancellor, downwards, went far beyond the bounds of ordinary hospitality. Even the University Staff Club, in its charmingly rural surroundings—and with its tempting billiard table—was thrown open to the visitors. The reception given by the University on July 17 was a glittering climax to a series of memorable social occasions. The fact that the Town Clerk and other senior officials of the Corporation were active members of the local executive committee showed, too, that the City was not going to be neglectful of its medical visitors. The Lord Mayor, Alderman D. Johnstone, set the pace for the City's genial welcome, and he and the Lady Mayoress were the hosts at a civic reception in the Council House. Without the power to perform miracles the Chief Constable could hardly have unravelled the tangled skein of Birmingham's traffic specially for the meeting, but more than one B.M.A. member, disconsolately pointing his car against the flow of swiftly moving vehicles in a one-way street, found the friendly advice of a Birmingham constable most tranquillizing in emergency. The special service of buses which was arranged for the meeting helped to overcome what might have been a minor disadvantage—the distance of the university from the centre of the city.

At the Scientific Sections there was a well-adjusted mixture of "easy" and "stiff" discussions, and Mr. A. Gourevitch, the science secretary, and his helpers had every reason to be satisfied with the results of their efforts. The plenary session on "Chemotherapy of Infections" was packed, and the speakers, responding to the occasion, instructed and entertained their audience with lively and informative papers and answers to questions. A less spectacular meeting, but one at which many thought-provoking ideas were discussed, was the symposium held by the Section of Medicine on "The Physician and Hospital Planning." The Scientific Exhibition goes from strength to strength, and this year there was not a single exhibit which did not earn its place: because so many of the exhibits admirably succeeded in achieving their purpose, the judges had great difficulty in selecting the prize-winners.

The keenest visitor to an Annual Meeting cannot possibly find time to see and hear all that is going on. At Birmingham he had to go to at least one or two of the closed-circuit telecasts and, if not to all the medical centres in Birmingham which threw their doors open to visitors, at least to the overwhelmingly impressive Queen Elizabeth Hospital. Then again there was an attractively varied programme of films (arranged by the B.M.A.'s Film Library) to be seen every day, and, in addition to the usual bright display of surgical instruments, drugs, and books, a number of special exhibitions had been arranged, notably the historical exhibition of medical books. Right on the doorstep, too, was the Barber Institute of Fine Arts, where those bemused by science could take refuge among the productions of a different type of endeavour. While the medical visitor hurried from one lecture theatre to another, attuning his ear at one moment to remarks on "girth control" and focusing his eyes at another on the elimination of a haemorrhoid in full colour, his wife and other ladies were enjoying the agreeable surroundings of the Ladies' Club at Winterbourne, which the chairman of the Ladies' Committee, Mrs. L. S. Gathergood, had made a refuge from the bustle of the meeting. From Winterbourne expeditions sallied out to Stratford, Lichfield, and to other places of interest, including the works of the Austin Motor Company at

Longbridge and Cadbury's famous factory at Bournville. As if to emphasize that Birmingham was not an exclusively industrial city, flowers in great profusion and variety gave a colourful background to what was already a colourful meeting. Private hospitality, as would be expected from Birmingham, was most generously given, not only to house guests but also to many parties of visitors who, during tours of the district, descended from their buses at the homes of Birmingham members and were sent refreshed on their way. So another Annual Meeting has come to an end—a highly successful one, conducted with admirable vigour and efficiency. As the memory of it fades, so the work for the joint meeting with the Canadian Medical Association at Edinburgh in 1959 will go ahead with increased momentum.

THE R.B. AND THE N.H.S.

Some 500 Representatives from Divisions and Branches of the B.M.A. were certainly in no mood to look back at the past ten years of the N.H.S. with satisfaction. The present discontents were emphasized by three decisions announced at the Birmingham meeting. The first was the Representative Body's approval of the action of the Council to set up, in consultation with the Royal Colleges, the Scottish Royal Corporations, the College of General Practitioners, and the Society of Medical Officers of Health, a committee to review the health services of the country. The second was the statement of the Chairman of the General Medical Services Committee, Dr. A. B. Davies, that a "non-medical expert of eminence" was to advise a special subcommittee which was studying possible alternative schemes for providing medical services to the public. The third was the announcement by the Chairman of Council, Dr. S. Wand, that the contractual validity of the general practitioner Spens Report was to be tested by Scots law.

Those who take the trouble to read the full reports of the A.R.M. proceedings in the *Supplement* of last week and this will find more than enough evidence of the present disillusionment in the profession. All the more striking because of the studied moderation of his tone was the report of the Chairman of the Central Consultants and Specialists Committee, Mr. Holmes Sellors, on the hospital and consultant services. He brought out yet once again the sad and sorry plight of the time-expired senior registrar. Some 200 and more cannot be employed as consultants "although in nearly every case they were fully equipped for consultant work." Repeated attempts had been made to persuade the Ministry of Health to conduct a survey of hospital establishments; but the Ministry had persistently refused to do so. It had been hoped that during such a review the Ministry might give some of the time-expired registrars some security against the risk of dismissal, or a salary increase: but that had been refused. And the Minister of Health, in flat opposition to the C.C. and S. Committee and the Joint Consultants Committee, had created a special type of post—a subgraded consultant—to be filled by regional hospital boards. In the meanwhile a working party had been set up to study hospital staffing, and it was hoped that through this some solution might be found of the problems facing the senior registrars and the senior hospital medical officers. Mr. Holmes Sellors told the meeting that when the Staff Side of Whitley Committee B put before it the cases of some 500 S.H.M.O.s as coming up to consultant standard, "it appeared that the Management Side had had no idea that the problem was so extensive." Mr. Holmes Sellors moderately called this a "disconcerting feature." The appalling thing is that there is a crying need for more hospital beds and more consultants: and yet the men who have been trained to this end are denied the opportunity to complete their careers. Dr. E. A. Gerrard gave some alarming figures in this connexion. In surgery, he said, there were four people waiting for every bed in London's teaching hospitals, and five for every surgical bed in the provinces. In his own hospital in Manchester, with just over 100 beds, there was in December, 1957, a waiting-list of 2,676: non-urgent cases had to wait as long as three to four years before being admitted. Small wonder that he burst out thus: "This in a Health Service which is claimed to be the envy of the world. What complacency! What deception! What a scandal it all is!"

The Representative Meeting's principal concern is with medical politics and problems of medical organization. Dr. R. G. Gibson, Chairman of the Organization Committee, has, with his committee, been successful in rousing interest among younger members of the B.M.A. through the Junior Members' Forum, the first meeting of which was held two months ago.[1] He has, too, been looking into ways and means of rousing the average member from an apathy and inertia which are typical of all kinds of electorates. One such move towards this came in the shape of a motion from the Winchester Division that the Council should set up an intraprofessional information service "as a matter of urgency." Those who supported this motion certainly had different ideas on how to set about this. One speaker thought that "an efficient committee clerk could probably do

[1] *Brit. med. J., Supplement*, 1958, **1**, 352.

all that was necessary." Another envisaged "a full-time information officer," who would work in contact with all the Association's committees and "collect, correlate, and disseminate information." It was finally resolved that the Council should look into the arrangements for improving intraprofessional relationships and solidarity "in view of the approaching medico-political storm."

The R.B. gave its attention to a great many other matters, and in particular through the report by Dr. J. B. Tilley, Chairman of the Public Health Committee, showed its concern with the health of the community. Much of the discussion on several subjects was inaudible to many owing either to defective installation of microphones and loudspeakers or to the bad acoustics of an otherwise excellent hall. Dr. A. Beauchamp, the Chairman of the R.B., had his task made trebly difficult by this great acoustic disadvantage, and on occasion he had to repeat statements two or three times. All this undoubtedly added up to a considerable loss of time over the four days of the A.R.M., but in spite of this handicap the Chairman conducted the business with exemplary fairness and patience. Those Representatives who missed much of what was said from time to time will, it is hoped, be able to fill in the gaps by reading the account of the meeting in the *Supplement*. And if other members of the B.M.A. would read the account they would then be informed of the views on a variety of important subjects held by a representative cross-section of the medical profession.

RUSSIAN VACCINE FOR MULTIPLE SCLEROSIS

An important communication from Moscow appears in the correspondence columns this week (p. 245). It is on the Russian vaccine for multiple (or disseminated) sclerosis, and is signed by Professor George Dick, of the Queen's University, Belfast, who has recently visited the Soviet Union, and Professor A. K. Shubladze, Chief of Laboratory of the Ivanovsky Institute of Virology, Moscow. Professor Shubladze is in complete agreement with the findings of Dick and his colleagues, published recently in this *Journal*,[1] that the virus which is used to make the Russian multiple sclerosis vaccine of Shubladze and Margulis is similar to rabies virus. It is possible to go further than that, for the virus of the vaccine of Shubladze and Margulis is not only similar to rabies but is antigenically indistinguishable from it. This strain of rabies virus (which is apparently the so-called *street* virus), came from a strain of virus claimed to have been isolated from the blood of a patient with a peculiar acute encephalomyelitis syndrome.[2] We understand that the original isolates of this virus are to be reinvestigated, but there is no evidence that it is causally related to multiple sclerosis; indeed, there is no satisfactory evidence that any virus is. As to the vaccine, there is no significant evidence of its clinical value either in the U.S.S.R. or in other countries of Europe where it has been tried. Furthermore, as was pointed out in these columns recently,[3] the administration of it may possibly be harmful.

The marketing of this vaccine without any reliable evidence of its clinical value is unfortunate. Equally so is the publicity that must have raised the hopes of many sufferers from multiple sclerosis. Patients with this disease should be informed of the nature of the virus from which the vaccine is made, that the vaccine may be dangerous, and that it has not been shown to do any good. It is satisfactory that virologists in the U.S.S.R. and in Great Britain and Northern Ireland have reached such complete agreement on this vaccine and virus, an event that illustrates the great importance of personal exchanges of information between scientists of the two countries. It should also help to remove the vaccine from the political skirmishing that has been its lot in Britain.

[1] Dick, G. W. A., McKeown, Florence, and Wilson, D. C., *Brit. med. J.*, 1958, **1**, 7.
[2] Margulis, M. S., Soloviev, V. D., and Shubladze, A. K., *J. Neurol. Neurosurg. Psychiat.*, 1946, **9**, 63.
[3] *Brit. med. J.*, 1958, **1**, 821.

TREATMENT OF CERVICAL SPONDYLOSIS

Cervical spondylosis is a term which is sometimes given a restricted meaning. But it is a useful term for all those chronic lesions of the cervical spine in which compression of the spinal cord or nerve roots is brought about by medial or lateral protrusions of the intervertebral disk, or by osteophytic outgrowths from the vertebral bodies and the neighbourhood of the joints of Luschka, where they may encroach on the intervertebral foramen and so compress the nerve roots. These outgrowths probably owe their origin primarily to disk degeneration, and have been found in 75% of a sample of hospital patients.[1] Cervical disk lesions are often associated with disk degeneration in the lumbar region, as might be expected, but the incidence of acute herniation of the nucleus pulposus is very much less in the neck. Not only is the disk much smaller, but the region is subject to very different strains and stresses. Acute herniation may be independent of cervical spondylosis. Because of the proximity of the spinal cord, the symp-

[1] Pallis, C., Jones, A. M., and Spillane, J. D., *Brain*, 1954, **77**, 274.
[2] Clarke, E. A., and Robinson, P. K., ibid., 1956, **79**, 483.
[3] Cleveland, D. A., *Postgrad. Med.*, 1955, **18**, 99.
[4] Spurling, R. G., *Lesions of the Cervical Intervertebral Disc*, 1956. Springfield, Illinois.
[5] Brain, W. R., *Ann. intern. Med.*, 1954, **41**, 439.
[6] Mair, W. G. P., and Druckman, R., *Brain*, 1953, **76**, 70.
[7] Scoville, W. B., *Conn. med. J.*, 1954, **18**, 894.
[8] Odom, G. L., Finney, W., and Woodhall, B., *J. Amer. med. Ass.*, 1958, **166**, 23.
[9] Haynes, W. G., *J. med. Ass. Ala*, 1956, **26**, 261.

toms are severe and sudden in onset. There is no divergence of opinion about the need for surgical treatment in such cases. It is in the relief of chronic symptoms and signs that controversy has arisen.

The conditions of cord and root compression are best considered separately; one or other usually predominates. For the treatment of cord compression, E. A. Clarke and P. K. Robinson[2] concluded that conservative measures should be used at first, and continued if no further progression of symptoms has taken place. Failure to arrest the progress of the condition necessitates laminectomy and division of the dentate ligaments to allow the cord to ride freely over the protrusion. There is a large measure of agreement upon these principles, though some authors advocate traction,[3,4] while others prefer immobilization.[2,5] However, the socially unacceptable nature of most cervical collars limits their use to some extent. The most that should be hoped for from surgical treatment is that the progress of the disease may be arrested. W. R. Brain[3] has pointed out that arrest is often spontaneous, but with surgery it is hoped to bring this about more rapidly and also to prevent extensive cord damage.[6] He has also drawn attention to the danger of manipulation in these cases.

Many more operations are performed for cervical root compression in North America than in this country. Of 250 patients with cervical spondylosis operated upon by W. B. Scoville[7] in a period of eight years, all but six had lateral protrusions and osteophytes. G. L. Odom, W. Finney, and B. Woodhall[8] have just reported a similar number of patients treated over a period of 16 years, of which 72% were of this type. Though good or excellent results are claimed for 84% of lateral disk protrusion, and for 67% of those with foraminal spurs, the length of follow-up is not stated, and—as in some other papers advocating surgery[9]—it is not clear that a later return of symptoms has been excluded. There is a far from negligible risk of producing further damage to the cervical roots and cord when attempts are made to remove osteophytes. On this side of the Atlantic, operation is generally reserved for cases on whom conservative treatment has failed; spontaneous remission is quite common, and most surgeons are cautious in recommending operation. It is essential to differentiate other causes of pain in the upper limb, such as carpal tunnel compression of the median nerve, before concluding that the source is a cervical spondylosis, which may well be present, though unrelated to the symptoms. In the future more reliable operations may be devised, or, better still, means may be found of preventing the condition from developing.

TREATMENT OF IDIOPATHIC THROMBOCYTOPENIC PURPURA

The indications for splenectomy in the treatment of patients with idiopathic thrombocytopenic purpura have never been firmly established. Since the operation was first proposed by P. Kaznelson[1] in 1916, its frequent dramatic success in raising the platelet level and arresting haemorrhage made it the sheet anchor of treatment for many years. Cure rates of over 90% were reported in some early series of cases, but it later became clear that post-operative improvement might be transient and that relapse might occur months or even years later. A more recent review of the effects of splenectomy in 303 patients with idiopathic thrombocytopenic purpura whose subsequent progress was followed for several years showed complete and lasting remissions in 61%, partial remissions in 17%, and failure in 22%.[2] Attempts to select patients more likely to benefit from the operation have been made, but neither the presence of eosinophilia and megakaryocytic hyperplasia in the bone marrow nor the existence of detectable circulating antibodies active against the platelets has proved of consistent value in forecasting response.[2-4] Splenectomy has generally been avoided in purpura of acute onset, particularly in children and when there is any possibility that the condition might result from a recent infection or exposure to drugs, because spontaneous improvement is likely in these circumstances. In such cases transfusion with fresh, platelet-rich blood, preferably drawn into plastic or siliconized containers to improve platelet survival, and accompanied by administration of A.C.T.H., cortisone, or prednisone, provides the most satisfactory form of treatment. When purpura continues for several months, despite medical treatment, and in patients with a past history of bleeding episodes, splenectomy is commonly advised, since A.C.T.H. and cortisone, though improving capillary fragility, often fail to increase the platelet count and afford only temporary control of haemorrhage.[3]

Certain recent observations, however, strongly suggest that splenectomy should no longer be regarded as the treatment of choice in chronic idiopathic thrombocytopenia. Disseminated lupus erythematosus has been reported to develop after splenectomy in patients who before operation showed the clinical and haematological pictures of idiopathic thrombocytopenia or acquired haemolytic anaemia, with no manifest evidence of lupus,[6] and W. Dameshek and his colleagues[7] now claim that approximately 25% of all patients with apparently typical idiopathic thrombocytopenic purpura in whom the spleen is removed will eventually develop systemic lupus erythematosus. They think it possible that splenectomy in some way aids dissemination of the lupus process, which they believe to be present, in occult form, in many cases of thrombocytopenia. For this reason, and because the effects of splenectomy are in any case poorly predictable, he and his associates carried out a fresh assessment of medical treatment in thrombocytopenic purpura, with particular reference to the effects of prednisone on the bleeding tendency and the platelet count. Thirty consecutive patients, 11 with "acute" and 19 with "chronic" thrombocytopenia, were treated with prednisone in initial doses of 20 to 150 mg. daily. In 22 cases the platelet count rose to normal in 6 to 150

[1] Kaznelson, P., *Wien. klin. Wschr.*, 1916, **29**, 1451.
[2] Lozner, E. L., *Bull. N.Y. Acad. Med.*, 1954, **30**, 184.
[3] Harrington, W. J., *Sang*, 1954, **25**, 712.
[4] Stefanini, M., ibid., 1955, **26**, 83.
[5] Robson, H. N., and Duthie, J. J. R., *Brit. med. J.*, 1950, **2**, 971.
[6] Dameshek, W., and Reeves, W. H., *Amer. J. Med.*, 1956, **21**, 560.
[7] —— Rubio, F., Mahoney, J. P., Reeves, W. H., and Burgin, L. A., *J. Amer. med. Ass.*, 1958, **166**, 1805.

days, and remained well above haemorrhagic levels on maintenance doses ranging from 2.5 to 15 mg. daily. The dosage of prednisone was frequently altered to find the lowest effective dose in each case, and the drug was withdrawn entirely from eight patients without relapse. Prednisone appeared to be much more effective in raising the platelet count than either A.C.T.H. or cortisone in comparable dosage, and the authors now regard it as the treatment to be preferred in both acute and chronic forms of the disease, splenectomy being reserved for the occasional severe cases that fail to respond. The use of prednisone and of splenectomy in the treatment of idiopathic thrombocytopenic purpura offers a close parallel with their use in idiopathic acquired haemolytic anaemia. In both diseases splenectomy is variably and unpredictably successful and has possible concealed risks, and is therefore best postponed until prednisone has proved ineffective or effective only in doses too high to be tolerated for long periods. Provided control can be achieved and maintained with doses of prednisone small enough to avoid serious drug toxicity, this approach seems eminently sensible.

BYSSINOSIS

For nearly two hundred years Lancashire has been identified with cotton manufactures. While these brought wealth and industry, now unfortunately declining, to the population of the crowded mill towns, they also caused an inordinately high morbidity and mortality from chronic respiratory disease. The whole community suffered excessively from bronchitis, which was non-occupational but due to pollution of the atmosphere by the acrid smoke of house and factory chimneys.[1] Certain groups of workers, notably those employed in the processes of preparing the cotton and in the cardrooms and blow-rooms suffered additionally from "asthma," which was occupational and popularly attributed to the irritation of cotton dust. J. Leach,[2] a certifying surgeon of Heywood, Lancashire, described the disorder in 1863. Since then the disease, byssinosis, has continued to occur, causing chronic ill-health, disablement, and death. In recent years byssinosis has been the subject of extensive researches—clinical, pathological, and epidemiological—by R. S. F. Schilling and his co-workers,[3] who have been admirably assisted by the mill owners and by the trade unions. In seeking ways of preventing this disease, or at least of minimizing its effects, occupational health workers must first estimate its prevalence and identify its cause or causes, and this entails a critical differentiation of occupational from non-occupational cases of chronic bronchitis. Schilling and his colleagues concluded that the symptom complex of chronic bronchitis is not the same as that of byssinosis, for whereas men with chronic bronchitis develop tightness of the chest whenever they are exposed to an irritating concentration of any dust, in the early stages of byssinosis the workers are affected only by cotton dust and only on Mondays or on the day immediately following absence from work. They divided the disease into two stages—grade I in which chest tightness and/or breathlessness occur on Mondays only, and grade II in which chest tightness and/or breathlessness occur on Mondays and other days. But even in grade II the symptoms are worst on Mondays. This means that the occurrence of Monday symptoms,[4] previously called "Monday feeling," is the specific characteristic in the diagnosis of byssinosis.

In 1956 the Industrial Injuries Advisory Council reported that although an experienced observer visiting the cotton mill on a Monday might be able to decide with some assurance whether a person was experiencing the symptoms of byssinosis (grade I), there was no simple objective test by which the disorder could be distinguished. C. B. McKerrow and his colleagues[5] have recently sought to discover such an objective test. In a carefully planned study, which is another example of the excellent scientific work initiated by Dr. R. S. F. Schilling and supplemented by the Medical Research Council's Pneumoconiosis Research Unit at Cardiff under the direction of Dr. J. C. Gilson, they measured respiratory functions by the accepted modern methods; these included indirect maximum breathing capacity (M.B.C.), maximum voluntary ventilation (M.V.V.), and peak inspiratory and expiratory flows coupled with an airways resistance (A.W.R.). The results showed distinctive specific patterns for both grades of byssinosis and for the controls. McKerrow and his colleagues concluded that the mill dust—quantitatively as well as qualitatively—is the cause of the respiratory impairment and that it contains some pharmacologically active constituent. This work marks an important advance towards the establishment of a practical objective test for the detection of the earliest stage of the disease, especially as the specific changes in M.B.C. and A.W.R., but of less degree, were discovered among cotton workers without clinical byssinosis.

[1] Lane, R. E., and Campbell, A. C. B., *Brit. J. industr. Med.*, 1952, **11**, 118.
[2] Leach, J., *Lancet*, 1863, **2**, 648.
[3] Schilling, R. S. F., Hughes, J. P. W., Dingwall-Fordyce, I., and Gilson, J. C., *Brit. J. industr. Med.*, 1955, **12**, 217.
[4] Report of the Industrial Injuries Advisory Council, *Byssinosis*, 1956, Cmd. 9673, H.M.S.O., London.
[5] McKerrow, C. B., McDermott, M., Gilson, J. C., and Schilling, R. S. F., *Brit. J. industr. Med.*, 1958, **15**, 75.

DIAGNOSIS OF ACUTE PANCREATITIS

The consensus of opinion at the present time is that operation should be avoided in acute pancreatitis.[1] Such a view presupposes a correct diagnosis. Unfortunately this is seldom easy, especially since the disease is uncommon compared with such conditions as perforated peptic ulcer, gall-bladder disease, intestinal obstruction, and myocardial infarction, from all of which it has to be differentiated. The most widely used laboratory aid in diagnosis is the level of the serum amylase, but this test has several disadvantages. Normal values do not necessarily imply the absence of acute pancreatitis, while levels above 200 Somogyi units, which can be regarded as the upper limit of normal, may occur in a variety of conditions, including those already mentioned.[2] Never-

[1] Richman, A., *Amer. J. Med.*, 1956, **21**, 246.
[2] Burnett, W., and Ness, T. D., *Brit. med. J.*, 1955, **2**, 770.
[3] Cherry, I. S., and Crandall, L. A., Jr., *Amer. J. Physiol.*, 1932, **100**, 266.
[4] Keith, L. M., Jr., Zollinger, R. M., and McCleery, R. S., *Arch. Surg. (Chicago)*, 1950, **61**, 930.
[5] Pfeffer, R. B., Mixter, G., Jr., and Hinton, J. W., *Surgery*, 1958, **43**, 550.

theless a serum amylase concentration above 400 units is strongly suggestive, especially when accompanied by hyperglycaemia (which is seen in about half the cases) and by a leucocytosis with a relative lymphopenia. The rise, however, is short-lived and seldom lasts longer than 48 hours. An increase in blood lipase occurs later and is more persistent; this enzyme is relatively simple to estimate.[3]

Various other tests have been used. The serum calcium concentration is said to fall, presumably owing to combination of calcium with the fatty acids liberated by hydrolysis, but this usually implies a very poor prognosis. Some help may be obtained by radiography of the abdomen, especially if dilated loops of jejunum are seen round the area of the pancreas. A procedure which has recently been used with some success is to attempt to aspirate fluid from the peritoneal cavity.[4] For this purpose a trochar and cannula are inserted into the flank, and a fine polythene tube is threaded through the cannula as far as possible in a cephalic direction.[5] The cannula is then removed, so that the patient can be turned into various positions while an attempt is made to aspirate fluid. A positive diagnosis depends on the withdrawal of a haemorrhagic exudate with a very high content of amylase. This method too has its drawbacks, the main one being failure to obtain a sample, but it is at least simple and free from danger. It is worth considering in any patient in whom the question of acute pancreatitis arises, but it cannot yet be said that there is a reliable way of confirming the diagnosis of this serious disease.

HORMONE-INDUCED SEX CHANGES

The theory of sex determination by hormonal control is as old as Voronoff, but direct experimental evidence of this possibility is comparatively recent. Foetal intersex of various types can now be produced relatively easily in most laboratory animals by the administration of androgens to the mother, and there is accumulating evidence that similar effects may be reproduced inadvertently in the human female. G. Nellhaus[1] reports the case of a woman who had received a total dosage of 2 g. of methyltestosterone for habitual abortion, and who subsequently delivered a typical female pseudohermaphrodite, and he cites five other cases from the literature. Similar results are described following progesterone therapy for the same condition by other authors.[2 3]

Up to the tenth week of gestation the two sexes share the common indifferent genitalia, differentiation into male and female appendages taking place within the next six weeks. A. Jost[4] has shown that before this stage the genitalia are particularly susceptible to hormonal influence. The normal basic neutral structure is female, as in the ovum, future differentiation being directed by the testis, acting mainly through its testosterone secretion. Androgens administered to the mother at this crucial stage pass easily through to the foetus in rather high concentration, and any excess may cause changes in its sensitive external organs. If the genetic sex is male, the added androgen will have little effect beyond reinforcing the natural testosterone and perhaps producing temporary genital hypertrophy. If, however, the sex chromosome addition is female, such treatment may easily simulate the hormonal effects of normal testicular development, with the production of a type of intersex such as pseudohermaphroditism. The same effect may be produced with progesterone (which is used much more widely than the androgens for threatened abortion) through its partial conversion into testosterone during normal metabolism. Here, however, the total amount of androgen released is relatively small, 1 mg. of progesterone being equivalent, according to J. K. Lamar,[5] to 0.03 mg. of testosterone, so that its administration in the usual therapeutic dosage should be fairly safe. This cannot, however, be said for testosterone itself. Experimental and clinical observation shows that pregnant women taking large amounts of the hormone, particularly during the third and fourth months, may deliver a baby with abnormal external genitalia. Such treatment is anyway of doubtful therapeutic value, and in view of the inherent dangers it is probably unwise in any circumstances during early pregnancy.

[1] Nellhaus, G., *New Engl. J. Med.*, 1958, **258**, 935.
[2] Reilly, W. A., Pickering, D. E., and Crane, J. T., *Amer. J. Dis. Child.*, 1958, **95**, 9.
[3] Wilkins, L., and Jones, H. W., *Pediatrics*, 1958, **21**, 513.
[4] Jost, A., in *The Comparative Physiology of Reproduction and the Effects of Sex Hormones in Vertebrates*, p. 237, ed. I. C. Jones and P. Eckstein, Cambridge, 1955.
[5] Lamar, J. K., *Anat. Rec.*, 1937, **70**, Suppl. 45.

MORE POLIO VACCINE

The Medical Research Council has produced compelling evidence[1 2] that a third, or booster, dose of poliomyelitis vaccine is needed to maintain circulating antibody at levels likely to confer protection. Its results agreed with those of several American studies, which were discussed last year in these columns,[3] where the suggestion was made that children who had had two doses should be offered a booster in the spring. Unfortunately this apparently was impossible. The Government's hope that supplies for this purpose will be available in the autumn, expressed by the Minister of Health last Monday, is therefore welcome. The offer of vaccination is also to be extended to people aged up to and including 25, and to a wider range of hospital staffs and their families. The Minister and the Secretary of State for Scotland are to consult with the B.M.A. and local authority associations on the details of continuing this elaborate campaign in preventive medicine.

Whether further doses beyond the third will be needed to maintain immunity has yet to be discovered, for much mystery still surrounds the nature of immunity and the relation between level of antibody and the protection it confers.[4] The studies that are now being carried out may throw light on that within the next year or so. But, owing to the complex administrative arrangements that must of necessity be made to give these injections, it is a possibility worth keeping in mind. If the disease is to be reduced drastically, as diphtheria has been, for instance, very large numbers of inoculations may have to be performed, at least for some years.

[1] Report to the Medical Research Council, *Brit. med. J.*, 1957, **2**, 1207.
[2] —— ibid., 1958, **1**, 1206.
[3] Ibid., 1957, **2**, 1229.
[4] Ibid., 1958, **1**, 1227.

British Medical Association

ANNUAL MEETING, BIRMINGHAM, 1958

SUMMARY OF PROCEEDINGS

FIRST PLENARY SESSION—REHABILITATION

Wednesday, July 16

The chairman, Dr. DONALD STEWART (Birmingham), emphasized that rehabilitation was a subject of importance to medical practitioners in every field, and hence the wide range of interests represented by the opening speakers, who were respectively a professor of medicine, an orthopaedic surgeon, a psychiatrist, a physical medicine consultant, and an industrial medical officer.

Professor R. E. TUNBRIDGE (Leeds) said that his purpose was to show the need for the profession to apply the lessons with which it was familiar. Rehabilitation was a professional responsibility, and as a profession we should press for the provision of a more complete service, particularly for all forms of planned convalescence. The changing practice of medicine and the changing structure of society had created both new problems and new opportunities. With an increased expectancy of life at birth more people were now living long enough to contract the chronic disabilities of the second half of life, particularly heart disease, cerebrovascular and peripheral vascular disorders, arthritis, chronic chest diseases, and mental disorders. This constituted a new problem, that of medicated survival. Rehabilitation was an attitude of mind, and much of value could therefore be achieved if the medical profession was alive to its responsibility. Many doctors considered it only as a problem after trauma, but in fact disability directly attributable to trauma constituted less than 25% of total disability at the present time, while 75–80% was due to the so-called internal diseases. Official sources tended to underestimate the size of the problem. The few detailed surveys carried out in this field showed that nearly one-sixth of the patients discharged from a general hospital were unsuitable for full employment, while about one-third were still at home three months after discharge. Social factors interfering with recovery seemed to assume greater prominence between the ages of 45 and 54 years. On reaching retiring age some 25% of men and 14% of women were chronically sick and a further 25% of men and 30% of women gave ill-health as their chief reason for retirement on reaching pensionable age. There was evidence to suggest that in the interest of health every year some 40,000 men between the ages of 55 and 64 years might with benefit change their job to a more suitable form of employment. Ministry of Labour industrial rehabilitation units had been concerned chiefly with industrial problems and with late results rather than with the early stages of disability, but the B.M.A. committee had suggested that there was an unnecessary amount of ill-health and unrelieved disability in the period of one to six months after the onset of disability. The report of the Ministry of Health inquiry into the reason for prolonged ill-health of three to six months' duration would be studied with great interest.

Value of Customary Activities

Mr. L. W. PLEWES (Dunstable), speaking of rehabilitation as seen by the surgeon, said that during the war the need to salvage every possible pair of hands had reawakened interest in rehabilitation, and tremendous strides had been made in Britain, which still led the world in this field. It was, however, easier to convince the general public about the need for rehabilitation in a time of full employment than when times were bad. It should never be forgotten that the best form of rehabilitation was normal activity. We should pander more to a man's belief that he was important in his work. Most difficulties could be overcome if we took the trouble to work out a solution and persuaded the employer to apply it. For example, the man with a Colles fracture did not get a stiff wrist, wasted muscles, or a frozen shoulder if he used his hand in a normal or near normal manner while in plaster. Furthermore, he lost no morale and maintained confidence in his own usefulness to the community as well as averting financial hardship. Finally he achieved a perfect functional result. A man kept at work through the period of his disability never risked the shattering of the illusion that he was indispensable in his job. Only two types of case required admission to a rehabilitation centre. First, those with a severe fracture, say of femur or of tibia and fibula, or with multiple injuries and considerable disability. In these cases the test of fitness to return to work was the ability to get on and off a bus. Secondly, there were patients with a severe and prolonged disability such as hemiplegia, paraplegia, crippling joint disease, or progressive neurological disorder, and these had to learn how to live with their disability.

Mr. Plewes found that to provide a comprehensive rehabilitation service for a population of 250,000 the requirements were a hospital rehabilitation centre designed to cater for 50–60 people, a similar centre located in the largest local industry, an occasional place for in-patient accommodation in a regional centre, an occasional place in a regional industrial rehabilitation unit and training centre, and a sheltered workshop for the employment of at least 50 people. Ideally there should also be a unit for helping the disabled housewife. There was in his opinion a strong case for introducing an industrial medical officer into the staff of the Accident Service and rehabilitation centre so that he could follow his cases right through treatment while working in his factory.

Psychiatric Rehabilitation

Dr. MAXWELL JONES (Sutton) indicated the importance of the modern tendency to treat mental illness in the community at home rather than in hospital, and he expressed his pleasure that similar trends were becoming apparent in the field of general medicine and surgery. In psychiatry, rehabilitation and prevention were part of the same process, and the primary need for rehabilitation in this sphere was the training of doctors in social medicine. The advent of the Welfare State had solved many of the patient's worries. However, too many patients now tended to wait for something to be done to them, and the social services had taken the place that the family used to hold in aftercare. The artificial separation of treatment and aftercare services made the management of preventive psychiatry difficult. This difficulty had been overcome, however, in the few instances where integration had taken place between the local authority and local mental health services.

Most mental hospitals had a static pool of aged patients occupying beds. This could often be avoided if a request for admission was met by a visit to the patient at home by the psychiatrist and the psychiatric social worker. Under these conditions it could be indicated from the start that the family must assume responsibility. It could be made clear, for example, that the patient would only be staying in hospital for a short time while receiving some physical treatment. Often the patient could go to a day hospital while the relatives attended to their jobs, and similar arrangements could be made for holidays. These methods of management led to a change in the family's attitude to their problem, and the patient could often play a useful part in the life of the family.

Importance of Team Work

Dr. F. S. COOKSEY (London) traced the evolution of rehabilitation in Britain through the present century. Now, in its sixth decade, we were trying to implement the legislation made in the fifth. When one considered in detail the number of doctors and ancillaries involved in the rehabilitation of a single patient one was led to question whether it would not be wise to broaden in each case the scope of the interests involved so that there was wittingly some overlap. Although it was necessary to implement the complicated statutory

mechanism which made rehabilitation available to all who needed it, there was no need for restrictive practices in medicine. No one doctor was ever in absolute control of a case, not even the general practitioner, and team work was therefore essential. Procedure should be simplified wherever possible. Some overlapping of the responsibilities of the ancillary workers would also be of advantage, since this would tend to relieve the shortage of such invaluable people as physiotherapists, occupational therapists, almoners, and other social workers. These aims could largely be satisfied by the extension of the use of resettlement clinics, both industrial and social, where all interested parties met to discuss the problems concerned from the earliest stages of illness right up to the time of final resettlement.

Forward planning was essential. As soon as a long-term case, such as a severe fracture or hemiplegia, was seen to be safely through the emergency period an inspection should be made of the home conditions so that an accurate assessment could be made of the physical difficulties which would face the patient on returning home. The necessary team of workers could then be mobilized and effective plans made for the home-coming of the patient long before the event. This system of forward planning had the great advantage of suggesting at the earliest possible moment to both the patient and the relatives that return home was not only desirable but inevitable, and the patient was never allowed to acquire the idea of staying permanently in bed. Dr. Cooksey agreed with Dr. Maxwell Jones that day centres were necessary, not only for psychiatric cases but also for those with physical disabilities.

Back on the Job

Dr. A. A. WHITE (Birmingham), speaking of rehabilitation from the viewpoint of the industrial medical officer, said that sooner or later after the primary treatment of illness or injury had been completed the patient had to be advised on the effect any residual disability might have on his normal activities and particularly on his job. Even when full resumption of normal activities could be legitimately anticipated it was important that the patient should be made to understand this, because unjustifiable anxiety might handicap recovery and even lead to the seeking of modified employment which was not to his ultimate advantage. The problem of advising the incompletely recovered patient was far more difficult, particularly as recovery of working capacity did not automatically proceed in step with organic recovery from illness or injury. The industrial medical officer rarely found that employees returning to work after illness or injury had any good understanding of the effects of their illness, although the majority were well informed regarding the nature of their disability and the treatment they had received.

Clinical examination procedures, however carefully performed, were designed to detect disease and did not, except at the extremes of disablement, enable accurate conclusions to be drawn about working capacity or occupational prognosis. The experience of the past ten years had led Dr. White to conclude that, at the end of treatment and convalescence as we knew them at present, insufficient evidence about residual fitness existed to allow the making of an accurate occupational assessment of the partially fit. The disablement following illness or injury consisted of three components—organic, that due to disuse, and psychological. Under existing conditions of medical aftercare all these contributed to the reduction of the patient's occupational capacity when he returned to work. The three components could be separately influenced and disablement reduced by a planned rehabilitation programme. This included a direct study of the true effects of the organic component on occupational capacity, retraining by stages to eliminate fatigue and loss of particular skills, together with careful explanation, reassurance, and encouragement to allay anxieties. A positive rehabilitation policy gave to the patient an understanding of the true limits imposed by his disability, an optimum physical and psychological adjustment to residual disablement, together with a knowledge of the safe range of future activity. In addition such a policy provided physical reconditioning and recovery of work habits with restoration of self-confidence. The doctor and the employer benefited by the acquisition of reliable information in terms of the actual working capacity of the patient, his level of skill, and his attitude and adjustment to his work. A serious criticism of objectives in treatment as they existed, particularly in hospitals, at the present time was that the total well-being of the patient tended to be lost sight of through too great a preoccupation with the actual disease and its treatment as an end in itself.

In expressing the appreciation of the audience Professor P. C. P. CLOAKE (Birmingham) reiterated the fact that rehabilitation had many aspects and many concepts depending entirely on the type of case to be dealt with. Adequate medicine consisted not only in treating acute episodes and then awaiting relapse but in active prophylaxis of future breakdown by careful rehabilitation from the earliest stages.

SECOND PLENARY SESSION—CHEMOTHERAPY OF INFECTIONS

Thursday, July 17

In his opening remarks the chairman, Professor D. M. DUNLOP (Edinburgh), briefly reviewed the successes and limitations of chemotherapy for infection. Its use had in two decades changed the face of medicine, with important social consequences. Many infectious diseases, however, were still beyond its influence, and superinfection with resistant organisms, especially *Staphylococcus aureus*, presented a growing problem in hospitals. The range of available agents was increasing, but thought and restraint were essential in using them.

How the Bacteriologist Can Help

Professor J. W. HOWIE (Glasgow) discussed three questions on which the bacteriologist could help the clinician in his application of chemotherapy. (1) *Which infections should be treated with antibiotics?* Penicillin was the drug of choice for erysipelas, scarlet fever, acute pharyngitis, and acute cellulitis, which were caused (or usually caused) by *Streptococcus pyogenes*; also for lobar pneumonia, gonorrhoea, syphilis, yaws, anthrax, and actinomycosis, and often for puerperal sepsis, meningitis, antral infections, bronchopneumonia, endocarditis, and septic fingers, which might be caused by *Str. pyogenes*. Sensitivity testing of bacteria isolated from the lesion was an important guide to treatment, though penicillin might reasonably be given before the results of bacteriological tests were known. Plague and tularaemia were best treated with streptomycin, typhoid and paratyphoid fever with chloramphenicol, typhus and undulant fever with chloramphenicol or tetracycline, meningococcal meningitis with sulphonamides, malaria with quinine, mepacrine, or proguanil, and trypanosomiasis with tryparsamide, suramin, and melarsen. (2) *Why antibiotics did not always succeed.* No drug, said Professor Howie, could succeed if the infecting organism was insensitive; into this group fell the viruses, and also resistant strains of bacteria, such as the staphylococci. The anatomy of the part and the pathological nature of the lesion could defeat chemotherapy even if the causal agent was sensitive; in necrotic bone, for example, or in urinary infection complicated by retention of urine. With certain exceptions—for example, bacterial endocarditis—these problems could not be solved by massive dosage or by combined therapy, and they were aggravated by the use of weak imitators of the major antibiotics. (3) *When antibiotics should not be used.* There was a place, said Professor Howie, for chemoprophylaxis in the surgery of infected tissue, for example, and in the control of rheumatic fever; but prophylaxis was out of place for clean operations or simple wounds and for normal labour. An antibiotic must not be used when a patient gives a history of sensitivity to it, and antibiotics

should never be used as a substitute for asepsis. Finally, it was important that the doctor should understand the pathology and bacteriology of the infection he was treating.

Non-tuberculous Pulmonary Infections

Professor C. H. STUART-HARRIS (Sheffield) spoke on the chemotherapy of non-tuberculous pulmonary infections. He said that the respiratory tract was probably subject to attack by a wider range of organisms than any other. Chemotherapy had achieved great successes in this field, but also suffered from defeats, and there were no rules of treatment which could replace diagnostic acumen and vigilance. The prognosis for pneumonia had been transformed by chemotherapy; mortality had fallen (though this fall began before the sulphonamides were introduced), and lobar pneumonia had also become less common in hospital practice. It was now the pneumonias of old age and of those with diseased lungs which were predominant. The clinical presentation of pneumonia had changed, many cases with radiological changes showing no consolidation. Of cases in which consolidation was present 20 to 50% had no pathogenic organisms in the sputum, but their response to chemotherapy was no different from that of the cases which yielded pathogens; a viral aetiology was therefore not to be assumed in these cases, and chemotherapy should begin at once if there was consolidation. Pneumococci were the commonest infective agents, and clinical trials had shown that penicillin, the tetracyclines, and chloramphenicol had similar therapeutic value in pneumococcal pneumonia; penicillin, which had the least toxicity, was therefore favoured. Streptomycin was useful for pneumonia due to coliform bacilli, and nystatin possibly useful for fungal pneumonias.

Failure of chemotherapy, as shown by the 5% of patients who died, was attributable to various factors, including age, heart disease, previous lung disease, and delay in starting treatment. In the recent influenza epidemics staphylococci were the commonest organisms associated with pneumonic complications, and many were resistant to antibiotics; but patients often died from this fulminating infection even when the organism was sensitive. Early diagnosis was aided by the examination of Gram-stained films of sputum, and treatment should begin at once with penicillin, streptomycin, and (in severe cases) erythromycin, modified later if necessary.

Apart from influenza, psittacosis, and Q fever, virus pneumonias were mostly trivial. There was little evidence that antibiotics would affect their course; penicillin and tetracycline, however, were active against the virus of psittacosis and the rickettsia of Q fever, and antibiotics should not be withheld unless infection was trivial or identifiable as "atypical" or virus pneumonia. Although acute bronchitis in children was often caused by viruses, antibiotics should, in general, be used for the control of concomitant bacterial infection. Exacerbation of chronic bronchitis in adults was not associated as a rule with any change in flora, and a virus was probably responsible. The value of chemotherapy was therefore limited, but chloramphenicol or preferably oxytetracycline was worth using, as it diminished the amount of sputum and coughing. Indications for prophylactic use of antibiotics to prevent exacerbations were more doubtful.

Chemotherapy for Pulmonary Tuberculosis

Professor JOHN CROFTON (Edinburgh) spoke on chemotherapy for pulmonary tuberculosis. He said that the right use of modern methods of chemotherapy made it possible to aim at 100% success in the treatment of this disease. Deaths from tuberculosis had fallen dramatically since the introduction of chemotherapy in 1947–8, and hospital statistics showed that the incidence of new cases was also falling. Prophylactic chemotherapy might be considered (*a*) in children with a positive tuberculin test as the only evidence of infection, (*b*) in adolescents with strongly positive tuberculin tests but no detectable disease, and (*c*) in patients with lung lesions of doubtful activity. As regards the first of these indications, a controlled trial in the United States had shown that 0.7% of children under 1 year of age treated with isoniazid later developed clinical tuberculosis, compared with 3.3% of untreated controls. For these, prophylaxis was probably justifiable, but for older children and for those in groups (*b*) and (*c*) treatment was best left until signs appeared.

In active tuberculosis chemotherapy was always indicated. For mild cases with negative sputum bed rest was found, by controlled trial, to be unnecessary (provided supervision was good). Infectious cases, however, should always be treated in hospital until their sputum was negative; in many cases this would take no more than three or four months. All the patients in a series studied in Edinburgh had negative sputum after 10 months of treatment, and there were no relapses in patients who had been treated for 18 months. Tubercle bacilli could not be isolated from lungs resected more than 18 months after the beginning of treatment. The situation was quite different if the organism was resistant to two or more of the standard drugs, and an effective scheme of combined therapy was essential in order to prevent the emergence of resistance during treatment—e.g., streptomycin (1 g.) daily, and P.A.S. (5 g.) and isoniazid (100 mg.) twice daily until the sensitivity pattern was known, when P.A.S. might be omitted if the other agents were active. For treatment at home the oral drugs, isoniazid and P.A.S., were more convenient. Corticosteroids given with chemotherapy might be helpful in very ill patients.

As a result of chemotherapy, collapse therapy had been largely given up and surgery was less often required. The older methods of treatment and less effective drugs (viomycin, pyrazinamide, cycloserine, and tetracycline) were necessary if the organisms were resistant to the standard drugs. Professor Crofton concluded by saying that in no disease was good doctoring more necessary than in tuberculosis.

Intestinal Infections

Professor A. C. FRAZER (Birmingham), speaking on chemotherapy against intestinal organisms, considered first the pathogens. For the treatment of dysentery, sulphonamides were effective, but should preferably not be given in the form of poorly absorbed compounds; drugs which are absorbed, such as sulphadiazine, were more capable of reaching the organisms and probably more effective. A loading dose should be given and treatment should be continued for several days after symptoms disappeared. The tetracyclines (preferably oxytetracycline) were also effective in the treatment of dysentery; for more vigorous treatment with these drugs it was better to shorten the interval between administrations than to increase the dose. For typhoid and, to a less degree, paratyphoid fever, chloramphenicol was effective; the toxic risks had been exaggerated. Food poisoning was usually due to toxins (e.g., of *Staph. aureus*), and for these chemotherapy did not help, but for salmonella infections chemotherapy—chosen by reference to sensitivity—was desirable. For infantile gastroenteritis associated with specific serological types of *E. coli* neomycin was the drug of choice.

Professor Frazer considered next the normal flora of the large intestine. *E. coli*, Bacteroides, and (variably) streptococci, clostridia, staphylococci, lactobacilli, Pseudomonas, and Proteus were, under normal conditions, non-pathogenic, but dangerous if allowed to invade the tissues (e.g., at operation); non-absorbed agents (e.g., neomycin with phthalyl sulphathiazole) given by mouth provided a relative freedom from bacteria within 48 hours, and were suitable for preparatory treatment before operation on the bowel. The normal flora of the gut had various effects—the production of stercobilin from bile pigments and of cholic acid from bile salts, the depolymerization of mucin, the synthesis of vitamin B complex and vitamin K, and digestion of cellulose, sugars, and other food components. These activities, which contributed nothing significant to the

normal body economy, were inhibited by antibiotics that eliminated the gut flora. It was probably desirable to administer vitamins under these conditions, and a preparation of antibiotic-resistant lactobacilli ("enpac") might be useful in preventing the replacement of the normal gut flora by potentially dangerous resistant organisms (e.g., *Staph. aureus* or candida). Increased activity of gut organisms and colonization of the small intestine could be seen in sprue and other forms of the malabsorption syndrome. Persistent steatorrhoea, which sometimes followed the acute phase of sprue, could be successfully combated by antibacterial therapy; in the acute phase, treatment with folic acid was usually successful and chemotherapy valueless.

In answer to questions, Professor Frazer said that nystatin might be used in prophylactic treatment of the bowel when *Candida albicans* was abundant. Professor HOWIE said that it was better to use neomycin and bacitracin than penicillin and tetracycline for local application; bacteria did not readily acquire resistance to them, and they were not likely to be given parenterally.

THE SECTIONS

SECTION OF MEDICINE

Monday, July 14

Poliomyelitis: the Present Position

At the first session of the Section of Medicine the subject discussed was "Poliomyelitis: the Present Position." The president, Professor W. MELVILLE ARNOTT (Birmingham), asked Professor MAX ROSENHEIM (London) to take the chair.

Dr. W. RITCHIE RUSSELL (Oxford) said that the sharp increase in the incidence of poliomyelitis in 1947 had offered opportunities for clinical study of the disease, of its early signs, and of the life-saving measures used in treatment, in particular those designed to overcome respiratory failure. After 1950 the separation of paralytic from non-paralytic cases for notification purposes had yielded more reliable figures, both of incidence and of mortality, and advances in treatment had been such that there was now little difference in mortality rates between epidemics. About 20–30% of paralytic cases were "life-threatening," but the actual fatality rate was now about 5%, a reduction which posed special problems in so far as the seriously handicapped survivors were concerned.

Management of Respiratory Paralysis

Centres with very experienced staff had now been established for the reception of the most dangerously ill patients. These fell into three groups. (1) Patients with simple paralysis of respiratory muscles. For these the modern tank respirators were adequate, provided they were used before breathing became seriously embarrassed. (2) Patients with the bulbar type of disease. Here paralysis of swallowing was highly dangerous and its early recognition was extremely important. Such patients were especially suitable for treatment in special units from which a team could often be sent to supervise their removal to hospital. The patients should be transported prone or semi-prone, with the feet raised; they should be under constant supervision and suction apparatus should be available. Maintenance of a good airway required postural drainage and often tracheotomy. Good recovery was possible even from a state of profound stupor. (3) Patients with both bulbar and intercostal paralysis. Here tracheotomy with a cuffed tube was best combined with intermittent positive-pressure respiration through the tube. This was efficient, eased changes of posture for physiotherapy, and enabled the patient to be transported long distances and to be nursed more satisfactorily on a tilting bed. Splints were troublesome in life-threatening cases, and, if passive movements were carried out each day for a few months from the very beginning, tight painful muscles would not develop. Though rest was important at first, it should not be carried to the extent of allowing weak muscles to shorten. If poliomyelitis decreased in the future, similar principles would still apply to the treatment of other diseases in which respiratory failure was a feature.

Epidemiology of Poliomyelitis

Professor G. W. A. DICK (Belfast), discussing the epidemiology of poliomyelitis, pointed out that of the three types of virus type 1 was responsible for 80% of the paralytic cases. Infection with all three types of some clinical degree was very common. Spread was by person-to-person contact, and children, in whom multiplication of the virus in the alimentary tract was greatest, were an important source of infection. There was no evidence that animals or birds played any part in the spread of the disease. After infection, virus remained in the throat for a few days and in the faeces for several weeks, and it was evident that certain families ("hot" families) were particularly susceptible to the spread of the virus and particularly capable of transmitting the disease. When one member of a family was infected practically all the others became infected, even if no clinical signs appeared, but whether infection was mainly from oropharyngeal or faecal virus had not yet been fully established. The "hot" families spread the disease with ease, but parallel with these were some clinical infections among "cold" families which were capable of producing immunity. It was not possible to prevent infection, but contact with the affected child and its siblings could be limited by quarantine. Live virus vaccination was so far suitable only for experimental purposes, since there was some evidence that when given by mouth an avirulent vaccine might show increased virulence on excretion. It was still not known why an epidemic occurred, but it was not owing to change in virus strains and was probably owing to change in the host.

Diagnostic Problems

Dr. J. F. GALPINE (Coventry) discussed three diagnostic problems of poliomyelitis. The first was the recognition of non-paralytic poliomyelitis, which was an example of an aseptic meningitis of viral origin. The C.S.F. was clear and contained 10 to 500 cells, with a predominance of lymphocytes and a slight increase in protein. Similar findings might be seen in mumps, benign lymphocytic choriomeningitis, and glandular fever. If such cases occurred in epidemic form without paralysis, then the Coxsackie or ECHO viruses might be responsible. Certain non-viral diseases, such as leptospiral infection, gave a similar picture, but the E.S.R. was high, the conjunctiva inflamed, the urine contained albumin, and antibodies were demonstrable in the blood. Tuberculous meningitis was a steadily progressive disease, with later development of cranial nerve palsies and characteristic chemical changes in the C.S.F. Partially treated septic meningeal and extrameningeal infections might also be confusing.

The second diagnostic problem was benign myalgic encephalomyelitis. This was a disease of unknown cause, but had a widespread distribution. It was not a fatal disease, but it had some sequelae and was associated with severe muscle pain, muscular twitchings, paresis and spasm, and a normal C.S.F. in over 50% of cases. The electromyelogram might show abnormal grouping of motor unit potentials hitherto unknown. Dr. Galpine described an outbreak at Coventry and also the Royal Free Hospital epidemic. Occurring sporadically, these cases might often be labelled "paralytic poliomyelitis" or "hysteria." The third problem was polioencephalitis. This might occur without evidence of paralysis, with symptoms such as confusion, daydreams, flights of ideas, and the clinical picture of an encephalitic state affecting cerebrum, brain stem, or cerebellum. As these were non-paralytic cases, the problem was how they should be notified.

Poliomyelitis Vaccine

Dr. JOHN KNOWELDEN (London) described the present situation so far as formalin-killed poliomyelitis vaccine was con-

cerned. He drew attention to the difficulties of assessing results of vaccination if a large group of patients were subjected to such a procedure without previous careful assessment. It had taken 50 years to clarify the situation regarding typhoid vaccine. Good controlled studies of the Salk vaccine showed that, among 200,000 children vaccinated in a blind trial, attack rates of paralytic poliomyelitis were only 28% of those among 200,000 children given a placebo. Investigations with British vaccine had shown that in the younger children (up to 5½) there was 80% better protection, and in the older children (5½ to 9) 84%, but the numbers were very small. Both in Britain and in America there was hardly any difference in the incidence of non-paralytic poliomyelitis in the two groups, so that with this vaccine it was unlikely that the reservoir of infection in the community would be reduced. Vaccination was now carried out in Britain with two doses, with about four weeks between them, and it had been shown that a third dose six months later gave a bigger boost to antibody response than the second dose did. There had been no major catastrophe since the Cutter incident. It was still unknown whether the higher antibody response gave greater protection against paralytic poliomyelitis, what the optimum antibody level was, and for how long the effective antibody level remained. It would be a pity to take widespread action in ignorance of these facts, because as yet no attempt had been made to find out the answers.

In the discussion which followed Professor ARNOTT raised the question whether a centre dealing with patients with respiratory paralysis was best situated in isolation or whether it should be in closer contact with a general medical unit, bearing in mind the complex physiological problems involved.

Dr. T. W. LLOYD (Malvern) asked if vaccination should be given to those in a family who had been in contact with cases, and Professor DICK thought that this should be done.

In reply to Dr. NATHAN WALDMAN (Wolverhampton), Professor DICK said that he did not think that swimming-pools should be closed if the numbers admitted were limited and supervision prevented the swimmers from becoming physically exhausted.

Dr. R. M. S. MCCONAGHEY (Dartmouth) asked if, in view of the copious discharge of sewage into rivers and the sea, bathers were not in some danger. But Professor DICK considered the dilution factor to be far too great for this to be very real.

Dr. ROSITA R. RAMIREZ (Philippines) said that antibody studies showed that in young children from 5 to 9 there had been 95% infection. Dr. J. D. COTTRELL, of the World Health Organization, felt that in view of the high incidence of poliomyelitis in certain overseas communities immunization should be advised for all young adults going abroad.

Tuesday, July 15

The Physician and Hospital Planning

In introducing the subject "The Physician and Hospital Planning," the chairman, Professor W. MELVILLE ARNOTT, said that medical men had to take an intelligent and constructive interest in the tools of their trade, the places in which they worked, and the devices which they used. There were arrears of hospital construction to be overtaken, and it would be of great interest to hear the views of the four distinguished speakers who were to discuss the subject. They were: Dr. G. E. GODBER (Ministry of Health), Mr. L. FARRER BROWN (Nuffield Foundation), Professor T. MCKEOWN (Birmingham), and Dr. J. FRY (Beckenham).

Hospital Surveys

Dr. GODBER, reviewing the early planning for hospital services, said that the most significant contribution was a series of surveys of hospitals covering the whole country and sponsored jointly by the Nuffield Trust and the Ministry of Health. One general point of great importance which emerged from the independent consideration of each of ten surveying teams was the concept of the area general hospital. This was to provide all the ordinary range of specialties for a natural group of the population and was to be linked with regional special centres. For the first time in Britain hospital planning effectively got away from the design of a hospital of some empirically determined size and was thought of as a community service. The next attempt at large-scale planning was an office study which eventually led to the publication by the Ministry of Health of the "Memorandum on the Development of Consultant Services." That was the work of a group of senior consultant advisers drawn mainly from provincial teaching centres.

Thus regional boards had two kinds of preliminary survey to help them, but it was only from 1949 onwards that they began to have reliable statistics of the work which they were already doing and which might or might not be relevant to the work that needed to be done. As soon as statistics began to be available, wide disparities between areas in numbers of beds, of patients treated, and of use of beds were seen. The beds of one teaching hospital might each be used by twice as many patients in the course of a year as those of another. Apparently comparable hospitals showed wide variations in their bed turnover and waiting-lists, often with marked differences between the specialties.

Changing Nature of Hospital Service

The National Health Service had coincided with a period of great development in some highly specialized fields of medicine and surgery. In surgery, operations on the central nervous system, heart, or lungs, and, in medicine, the special techniques of cardiology or neurology, among others, were far past the experimental stage and had to be made available in one at least of the centres in every hospital region. Between 1949 and 1956 the numbers of admissions to beds for plastic, thoracic, and neuro-surgery increased respectively by 119%, 133%, and 82%. Patients admitted for orthopaedic and traumatic surgery increased by 70% and for gynaecological operations by 53%, compared with only 20% for general surgery. In neurology and dermatology increases were just over 50%, compared with an increase of only 24% in general medicine and a fall of 11% in paediatrics.

That change in the nature of professional services required in hospital was certainly not finished. The fact that more than three-quarters of the neurologists worked in the four metropolitan regions, where only one-third of the people lived, showed that the process of distribution of specialists was not yet complete. But, aside from the process of redistribution, medical advances were still necessitating staff changes. The medical planner, therefore, had to bear in mind not only recent developments which had already become accepted medical procedures but also the new techniques which were already coming into use in the special centres. Therefore, continued Dr. Godber, it should be a general principle of the planning of any area hospital now that it must lend itself to modification, adaptation, and possibly extension at some future time. The perfect monoblock, complete in itself for the needs which could be defined now but with no point at which addition could be made, was a medical and architectural vanity which could not be afforded.

Out-patient Services

Referring to turnover and out-patient services, Dr. Godber said that for very many years hospitals had been looked upon as residential establishments in which medical and nursing care was given. The rapid growth of out-patient services during the last twenty years had arisen largely from the improvement in diagnostic techniques. The work of hospitals was now carried on to a very large extent in the out-patient and diagnostic departments. In 1956 the out-patient and casualty departments of hospitals provided more than two-thirds of the work of radiological departments and almost one-third of the work of pathological departments. Moreover, both those diagnostic departments were steadily increasing the service they provided direct to general prac-

titioners. For every patient admitted to hospital wards, excluding obstetric cases, two were seen in out-patient departments; only about half the admissions to general hospitals were from waiting-lists, and thus little more than a quarter of the out-patients might be admitted to the wards. The hospital must therefore become more—not less—closely related to all the medical work of the area it served.

Hospital Building

Dealing, finally, with the planning of buildings, Dr. Godber said that the doctor's job was to tell the architect what amount of space was essential for his work; what special relationships that must bear to the other necessary constituents of the hospital; what kind of equipment he would want; at what points and for what purpose subsequent extension was most likely to be needed; and what would constitute a reasonable pattern of phased development if building must progress by stages. But the doctor should not insist on inessential architectural extravagances.

By way of illustration, Dr. Godber referred to the shape of operating theatres. "There is a vogue at this time in some countries for operating rooms of circular or egg-shaped design, for which are claimed special advantages in lighting and ventilation," he said. "It is by no means proved, however, that these advantages cannot be obtained in other ways, particularly in regard to ventilation; and it is hardly justifiable to insist that two theatres must be provided at a cost the equivalent of five of orthodox design, as occurred in one particular case."

The more detailed study of the actual design of buildings was perhaps outside the scope of the meeting, concluded Dr. Godber, but the physician had a large part to play in the design of the buildings and in the briefing of architects, but not in drawing the lines on paper for him.

Function and Design of Hospitals

Mr. L. FARRER BROWN (Nuffield Foundation) recalled that three years ago the Nuffield Provincial Hospitals Trust and the University of Bristol published a volume called *Studies in the Functions and Design of Hospitals* which was a record of some attempts to obtain valid evidence, tested by experiment, about the work of hospitals and the planning of their buildings. There were, he said, signs that those studies were beginning to influence hospital planners throughout the country in their approach to their task.

Mr. Farrer Brown cited three examples showing the wide range of possible future study. The first was an account of practical experiments in ward building, the second dealt with an important series of surveys of the demand for hospital care, and the third was a short account of a new study into the hospital care of children.

As to the first, at Larkfield Hospital in Scotland there had been the opportunity to test out in an experimental unit of 64 beds the ideas about medical wards developed from the Nuffield Trust studies. A comparable unit at Musgrove Park Hospital would be a testing place for the ideas about surgical wards, and also about operating theatres and central sterilization. Conclusions drawn from those studies were (1) that wards should be planned as double units within which two comparatively small units shared a central unit of ancillary accommodation. (2) A much higher proportion of single rooms than hitherto provided was necessary on medical grounds (but once that provision had been made the remaining beds might be kept in fairly large open units). (3) Three-quarters of all patients were likely to be able to get out of bed to use toilet facilities, and half would probably get up for meals; hence greatly increased provision was needed for lavatories, wash-rooms, and day-spaces. (4) Important economies in building costs, reductions in heating costs, and a reduction in nurses' journeys could be achieved if ward buildings were designed as comparatively short, thick buildings.

Demand for Hospital Care

As to the demand for hospital care, the results of two exploratory surveys of the case-load of hospitals in Norwich and Northampton had raised a doubt whether the scale of hospital provision for a given population need be as much as was popularly supposed. A pilot inquiry in the main general hospital in one area seemed to indicate that of the patients occupying medical beds during one week about a quarter could have been treated at home or in the out-patient department, and that about half were remaining in hospital longer than was necessary from the standpoint of what the hospital could do for them. There was also some indication that if the general practitioner had better opportunies for diagnosis fewer patients would have to be sent to the out-patient department.

Thirdly, on the question of what provision should be made for children in hospitals, records made in fifteen hospital groups (five of them teaching groups) over four 6-week periods during twelve consecutive months in 1956–7 showed that of nearly 5,400 children admitted to adult wards the proportions by age groups were: under 1 year, 1%; 1 to 4 years, 10%; 5 to 9 years, 33%; 10 to 16 years, 56%. Therefore, before considering what sort of children's hospitals would be needed in the future, much more precise information was required about the total number of children admitted to hospitals, their geographical distribution, and their classification by diseases. Reconnaissances in children's hospitals and units encouraged the view that, while the need to build isolated self-sufficient children's hospitals might have passed, there was a good case for separating the accommodation of children from the rest of the hospital. If a children's unit was part of a general hospital it could share many of the expensive services such as radiology and pathology; most important, the paediatricians could have contact with other medical colleagues. But the planning needs for children were so different from those for adults that they demanded a separate children's building.

As to the future, changing practice would affect hospital buildings in various ways; but probably the best answer was found by regarding the problem as one of town planning, and thinking of a hospital design from its earliest stage in terms of traffic flow and zoning. A hospital was a living, changing entity and not a static composition, and its constituent elements would change at different rates.

Unanswered Questions

Continuing the discussion, Professor T. MCKEOWN (Birmingham) said that the planning of hospitals might be said to raise two questions: How to keep patients out of hospitals, and how best to provide for those who must be admitted. Concerning himself with the second of those questions, he said that in spite of the considerable amount of research and planning which had been done some of the most fundamental questions remained unanswered. Three of them seemed to be of particular importance: (1) How to provide sufficient medical and nursing staff for mental and chronic sick hospitals, (2) how to make hospitals flexible in construction, site, and design, so that they would not quickly be out of date, and (3) how to avoid mixing patients with entirely different requirements within the same unit.

He suggested that, although they might appear to be very different in kind, those three problems and some others were attributable to the same circumstances. They were (*a*) the separation of hospitals for the mentally ill and chronic sick from the general hospitals, and (*b*) the traditional concept of the hospital as a single structure of more or less uniform design, providing a full range of services for all classes of patients.

Co-ordination of Services

Dr. J. FRY (Beckenham) said that in considering hospital planning it was very necessary to realize that it must be a part of a whole, and the planning of hospitals must be closely bound up with the planning of public health and general-practitioner services. "As a general practitioner I naturally feel that the medical centre of gravity has been moved too far over to the side of the hospitals, and that insufficient attention has been paid to the development of general practice," he added.

Dr. Fry said he would like to see unified local health areas which would be based on the main local hospital. Hospital, general practitioner, and public health services would be administered from one centre, and the three branches would be able to appreciate each other's problems more readily. No changes in the law would be necessary, and that type of experiment could be attempted now. The hospital of the future would have to be more aware of the needs of family doctors, by offering full facilities for investigations, by making available more maternity beds for general practitioners, and by encouraging a more active participation of general practitioners in out-patient departments. There would also have to be a shift of emphasis towards the projection of the hospital's services into the homes of the patients.

Among those who took part in the discussion were Dr. LOGAN (Manchester), Dr. J. D. LLEWELLYN-JONES (Malaya), Dr. J. A. MOODY, Dr. W. RITCHIE RUSSELL (Oxford), and Dr. SKENE.

SECTION OF SURGERY

Monday, July 14

Advanced Carcinoma of the Breast

The president, Professor F. A. R. STAMMERS (Birmingham), welcomed the members, and with Mr. E. C. B. BUTLER (London) in the chair the Section proceeded to consider the treatment of advanced carcinoma of the breast. The opening speaker, Dr. A. C. CROOKE (Birmingham), described the various hormonal factors influencing breast development. He stressed the complexity of the subject, pointing out that most of our knowledge was derived from study of the rat. Oestrogens alone did not induce any change in breast structure, but if combined with growth hormone development of the main ducts occurred. Progesterone and pituitary mammotrophin (prolactin) were necessary for growth of lobular structure. At term, lactation was induced by the sudden reduction of circulating progesterone and oestrogen in the continued presence of prolactin (together with adrenal glucosteroids). There was great variation among different species, and therefore knowledge derived from the rat must be applied to man with considerable reserve. Dr. Crooke warned against uncritical interpretation of hormone assays in the human. These substances could not be detected in blood, and only urinary estimation was at present available. Biological methods of estimating urinary oestrogens were unreliable, and chemical techniques, though sound, measured only a part of the oestrogen fraction. Present methods of pregnanediol assay were also unreliable. The 17-ketosteroid fraction was such a complex mixture of substances that its determination was almost without value (though knowledge of individual constituents might be of clinical importance). Growth hormone could not be assayed as yet. Hadfield, using a biological method, claimed to have detected a mammotrophin in human urine, but his results had been challenged, and other workers had failed to confirm them. Biological methods of assay using mice were notoriously difficult and capricious, but Hadfield's work might have important consequences; further attempts at confirmation should be made.

Adrenalectomy and Hypophysectomy

Professor L. N. PYRAH (Leeds) gave a short historical review of endocrine ablation operations. In rats, removal of sources of oestrogen secretion reduced the incidence of spontaneous breast carcinoma in cancer-bearing strains, while the administration of oestrogens increased it. Beatson in 1896 first showed that oophorectomy had a beneficial effect in the course of the disease in pre-menopausal women. More recently Huggins had shown that further improvement might be obtained by removing a further source of oestrogens, the adrenal glands. Professor Pyrah then reported the results in 76 patients with advanced breast carcinoma who had been subjected to adrenalectomy and oophorectomy. It was not possible to predict the effect of operation either by histological study of the tumour or by response to previous hormone therapy. There were nine post-operative deaths, but most of these occurred early in the series. Case reports were presented of patients with remarkable remissions of their disease: 38 patients in all had had a remission; 11 of them were still alive, but two had developed recurrence. In some patients the disease apparently disappeared from the body, no clinical or radiological evidence of malignancy being detectable. Four patients had remissions lasting for three years or more, the longest being three years and eight months. In nine the remission lasted for more than two years; 12 survived 18 months. The relief of pain and the prolongation of life achieved by this operation made it well worth while.

The results of 100 patients treated by pituitary ablation were presented by Mr. J. M. SMALL (Birmingham). The object of the operation was to remove all mammotrophic hormones and somatotrophin from the body. To do this the pituitary must be completely removed and the pituitary stalk destroyed to prevent regeneration of hypophysial tissue. This was technically difficult in some cases. Nine patients died after the operation, and there was some morbidity including diabetes insipidus (invariably) and minor visual field defects (in 30%); but none had been blinded. Even very ill patients withstood the operation well. The patients were divided into three groups according to their response to operation: those in full recession had complete disappearance of disease; those with partial recession were objectively improved but malignancy persisted; and, thirdly, those with no response at all. Patients with a long history who had responded well to hormone therapy, and who were just past the menopause, showed the best response. Of five patients who had had previous adrenalectomy only one went into full remission; her response to adrenalectomy had also been good. In his series 25% had a full remission and all but one were still alive, the longest survival being three years; 11% had only a partial remission and 6 of these were already dead. Half the patients had no response to pituitary ablation and had not survived more than ten months. Patients with secondary deposits in skin, glands, lung, and bone appeared to respond best to the operation; results in those with liver and brain metastases were disappointing.

What to Advise

The closing speaker, Mr. H. J. B. ATKINS (London), summed up the proceedings by asking what advice a practitioner should give a patient with advanced breast cancer. It had been customary to start such a person on hormone therapy—if she were past the menopause, with oestrogens; if before, with androgens. Oestrogens produced remissions in about two-thirds of patients over 60 years of age; the proportion was much smaller under the age of 60. Hence it would seem reasonable to commence treatment with oestrogens in the older age-group. In young women the response of carcinoma to endocrine ablation was much greater than the response to hormone therapy. Furthermore, testosterone, which was the more effective hormone in this age-group, was disappointing in its results, and side-effects, such as acne and hirsutism, were very distressing. Hence in pre-menopausal women it was probably wiser and kinder to proceed straight to operation. The injection of radioactive substances into the sella turcica to destroy the pituitary had not proved satisfactory even in the hands of its principal advocates. Mr. Atkins then proceeded to discuss the relative merits of hypophysectomy and adrenalectomy, using a series of 80 cases of each performed at Guy's Hospital to illustrate his remarks. At first it had seemed that hypophysectomy was much the better, but as more patients were treated it became apparent that the difference was not great and certainly not statistically significant. Despite the fact that pituitary ablation seemed

to give slightly better results it would be unwise to overemphasize this at the present time because of the relative shortage of expert neurosurgeons. A competent general surgeon could perform adrenalectomy with a low mortality. If hypophysectomy was attempted on a large scale by those unskilled in neurosurgical techniques the consequences might be disastrous. The difference in the results of the two methods did not justify wholesale adoption of pituitary ablation at the present time.

In answer to a question by Mr. HUGH CARSON (Birmingham), Mr. SMALL said that all patients subjected to hypophysectomy had had previous radiotherapy or hormonal treatment. He mentioned that the response of patients with pregnancy or lactation carcinoma had been very poor. Professor H. W. RODGERS said that in Belfast radioactive yttrium was inserted into the sella after hypophysectomy to destroy the last remnants of pituitary tissue. Mr. R. V. COOKE (Bristol), Mr. HERMON TAYLOR (London), and Mr. BUTLER also contributed to the discussion.

Carcinoma of the Rectum

Under the chairmanship of Mr. HUGH CARSON (Birmingham), Mr. E. C. B. BUTLER (London) then addressed the Section on restorative resection for carcinoma of the rectum and pelvi-rectal junction. He said that since the end of the last war this operation had competed with abdomino-perineal resection for neoplasms just above the peritoneal reflection. Preparation of the bowel with sulphonamides had made anastomosis at this level much safer than previously. Technically, it was necessary to mobilize the rectum and remove its middle portion. Bowel three inches (7.5 cm.) below palpable tumour was usually free of growth. Contraindications to operation were obesity, gross extrarectal spread, and an anaplastic type of tumour. The operation was a little more difficult than abdomino-perineal resection and carried a slightly higher mortality. Local recurrence at the suture line, which was a problem in the past, had now been largely overcome by clamping the bowel immediately below the tumour and irrigating the distal segment of the rectum with mercury bichloride solution (one part in 500). If there was tension on the suture line a temporary transverse colostomy was advisable; a rectal tube was passed up to but not through the anastomosis. Eighty operations for restorative resection of the rectum were performed between 1948 and 1958, with a mortality of 7%. During the same period they had done 181 abdomino-perineal resections, with a mortality of 4.5%. Restorative operation was possible more often in women than in men because of their wider pelvis. Survival rates after the two operations were similar in growths of types A and C (60% and 20% respectively). In type B cases the five-year survival after anterior resection was 69%, and after abdomino-perineal resection only 36%. This difference might be due in part to a different metastasizing potential between tumours above and below the peritoneal reflection. Below the peritoneum there was no barrier to extensive spread into the pelvic connective tissue. Recurrence had occurred at the suture line in five patients; four of them had also had generalized metastases at the same time. Mr. Butler thought that extensive operations for excision of cancer were on the decline. The lethal factor in most tumours was blood-stream spread, which at present was untreatable. He likened the situation to staphylococcal septicaemia; the burden was on research workers to produce a therapeutic weapon which would destroy metastases. Extensive dissection of lymphatic fields was of doubtful value; the surgeon's task was to remove the primary tumour as completely as possible.

In the ensuing discussion Mr. B. N. BROOKE (Birmingham) emphasized that the operation was excellent as a palliative procedure and was especially suitable for elderly patients. In America there was a tendency to use restorative resection for neoplasms of the middle third of the rectum, and he thought that we too should extend the scope of the operation. Mr. HERMON TAYLOR (London) agreed that blood-stream spread of metastases was the most important factor in prognosis. This usually had occurred before the start of treatment, which was the main reason why extensive lymphatic dissections were of little avail. Mr. E. G. MUIR (London) commented on some technical details of the operation; in particular he advised the use of a perineal drain situated behind the anal canal.

Pilonidal Sinus

Mr. A. J. H. RAINS (Birmingham) gave a short paper on the treatment of pilonidal sinus. On the surgical professorial unit at Birmingham these cases were treated by excision and primary suture. The operation was performed with the patient on his face in the "jack-knife" position. Indigo carmine was injected into the track. After complete excision the dead space was carefully obliterated with buried catgut stitches. "Nobecutane" and wool were used for dressing and the wound was sealed off from the anus with strapping. The patient remained prone for 48 hours after operation and then was allowed up. Hair in the natal cleft was kept trimmed. Four cases had broken down owing to the formation of haematomas; and there were 11 recurrences. Healing took between 10 and 14 days on the average. Mr. E. C. B. BUTLER (London) asked whether the hairs in the natal cleft should not be permanently suppressed by irradiation. In reply to a question as to how recurrences should be treated, Mr. RAINS said that he excised them again and once more sutured the skin *per primum*.

Tuesday, July 15

Hiatus Hernia

With Mr. HERMON TAYLOR (London) in the chair, Mr. R. H. FRANKLIN (London) opened a discussion on hiatus hernia. He first discussed the mechanism of the cardiac sphincter. Perhaps the most important factor in preventing reflux was the angle of entry of the oesophagus into the stomach. Free regurgitation, which was normal in infants, might persist throughout life without causing untoward symptoms. Reflux of gastric contents into the oesophagus might be caused by hiatal defects or an increase in pressure within or outside the stomach. Prolonged recumbency, tight corsets, and pregnancy caused increased pressure on the hiatus. Pylorospasm with delayed gastric emptying increased the tendency to regurgitation, and hyperacidity such as was found with duodenal ulcer increased the corrosive effect of the regurgitated fluid. There were three ill effects of regurgitation: pain due to oesophagitis, dysphagia from spasm or stricture, and haemorrhage. Oesophagitis might result in slow bleeding and a profound anaemia; frank haematemesis was caused only by an ulcer in the oesophagus or in the thoracic stomach. Symptomless patients needed no treatment, and those with mild symptoms only conservative measures. These consisted of weight reduction, prevention of gravitational regurgitation (especially at night), and a peptic ulcer regime. Operation was needed for patients with symptoms of oesophagitis uncontrolled by medical treatment. The stomach had to be brought below the diaphragm and the enlarged hiatus narrowed. This could be combined with pyloroplasty and vagotomy. Intractable stricture was best treated by partial oesophagectomy with a high anastomosis between stomach and oesophagus; a low anastomosis was likely to be followed by stricture at the suture line. If there was duodenal ulceration as well as stricture a Roux loop of jejunum should be used.

Continuing the discussion, Mr. A. M. DESMOND (London) estimated that between 3 and 14% of the adult population had symptomless hiatus hernia (these figures were obtained from radiological examination and laparotomy). He reiterated the causative factors, adding kyphoscoliosis to those already mentioned. Patients with a functional overlay to their organic condition were difficult to treat and did not get a good result after operation. Surgical treatment

was necessary if conservative measures failed or a complication developed. Treatment should consist of repair of the hernia, preferably through the abdomen to allow detection of concurrent abdominal lesions. He had recently added pylorotomy to facilitate gastric emptying. In a series of 158 patients there had been six deaths: 85 (65%) had good results; 25 (18%) needed medical treatment to keep them free of symptoms; and 22 (16%) were failures. In closing, Mr. Desmond emphasized that hiatus hernia might be a "red herring." The symptoms might be due to carcinoma of the colon, Crohn's disease, or some other abdominal lesion. He then showed a short film on the technique of operation.

Mr. J. L. COLLIS (Birmingham) said, in discussion, that associated duodenal and gastric ulceration was rare in his experience. He used the abdomino-thoracic approach and sutured the pillars of the right crus in front of the oesophagus. In this way the angulation of the oesophago-gastric junction was re-established.

Carcinoma of the Oesophagus

Mr. J. L. COLLIS (Birmingham) then addressed the meeting on the treatment of carcinoma of the oesophagus. Lesions two inches (5 cm.) above the aortic arch and below were suitable for surgical excision. In his personal series of 150 cases the mortality had been 14%; the figure was greater for high lesions than for those situated low in the oesophagus. After two years only a third of them were alive. He emphasized the importance of relieving the distressing symptoms of this disease if at all possible. The patient must be adequately nourished before operation was attempted, and this could often be carried out effectively by persevering with a high-calorie fluid diet; if necessary the insertion of a Souttar's tube would ensure adequate intake; gastrostomy should be used only as a last resort. Age was no bar to operation, but spread into the aorta or bronchus was a definite contraindication. If possible the tumour should be removed *en bloc* with the left gastric glands (which were involved in 75% of cases). A tube of greater curvature of the stomach was brought up into the chest to anastomose to the oesophagus. After operation gastric reflux was no great problem, provided that gravitational regurgitation was prevented. If excision was impossible the tumour might be by-passed; failing that, a large Souttar's tube should be passed through the growth: it was imperative to restore free swallowing at all cost. Gastrostomy had no place except in the pre-operative phase. Mr. Collis ended by stressing the challenge of this exceedingly difficult disease.

Sir STANFORD CADE (London) began by saying that if he had a carcinoma of the oesophagus he would want it resected. Megavoltage radiotherapy (two million volts and above), however, had been a great advance and was very different from lower voltage therapy. There were three main megavoltage methods available—the two-million-volt generator, the four-million-volt linear accelerator, and the theratron (containing the equivalent of 2,000 grammes of radium in the form of radioactive cobalt). The source must be rotatory so that only the area to be treated received radiation in any quantity. By this means skin and vital organs such as the lungs and spinal cord suffered little injury. Sir Stanford reported the results in a series of 48 patients with squamous cell carcinoma of the middle third of the oesophagus treated by megavoltage radiotherapy; 39 patients were dead; nine were alive, but three had active disease; there have been no five-year survivals. In a number of cases radiation provided excellent palliation, the patients being able to swallow normally. Dysphagia might persist, however, despite return to a normal radiological appearance. In some cases therapy caused a stricture, in others a broncho-oesophageal fistula developed. One patient whose growth was incompletely removed at operation had had radiotherapy and survived 3½ years. Sir Stanford concluded that supervoltage radiotherapy could not as yet compete with surgery in the treatment of carcinoma of the oesophagus, but it was much better than conventional radiation methods. In reply to a question by Mr. G. W. TAYLOR (London), he said that combined operation with radiotherapy had not yet been attempted.

Cold Legs in Young People

With Mr. HUGH DONOVAN (Birmingham) in the chair, Mr. G. W. TAYLOR (London) described the pernio group of syndromes; these are conditions which give rise to one variety or another of the chilblain lesion. Local ischaemia devitalized the tissues to such an extent that an inflammatory response resulted; fat necrosis was a typical lesion. There were two main varieties of perniosis, primary and secondary. The primary group included acrocyanosis, erythrocyanosis, and livedo reticularis. They were much more frequent in women, usually commencing at the end of the second decade and after a remission reappearing at the menopause. In acrocyanosis there was a cyanotic rubor of the fingers and toes; erythrocyanosis affected the back of the calf in young women. The latter was often associated with oedema, especially in warm weather. Mr. Taylor put forward the view that there was some defect in the microcirculation of the extremities. Lymphangiography in erythrocyanosis revealed hypoplasia of the lymphatic system in the affected limbs. These conditions were often familial. Secondary perniosis might be due to the late effects of poliomyelitis, a low basal metabolic rate, or occasionally to functional disease such as hysteria. Treatment consisted in avoiding local chilling and conserving body heat. Measures designed to achieve these aims cut across fashion trends, and Mr. Taylor said that he found it difficult to persuade such patients to wear woolly underwear, thick woollen socks, and long skirts. Occasionally vasodilator drugs such as phenoxybenzamine helped. Lumbar sympathectomy was often beneficial, but did not cure many patients; it was contraindicated in the presence of oedema. In reply to a question by Professor F. A. R. STAMMERS (Birmingham), Mr. TAYLOR agreed that these patients should give up smoking. Answering another speaker, he warned against sympathectomy in those with long-standing symptoms. Exercise and physiotherapy were desirable to increase the circulation to the extremities.

Fractures of the Jaw

Mr. R. O. WALKER (Birmingham) gave an interesting paper on fractures of the jaw. He first stressed the need for universal instruction in first aid to maintain an airway; patients might die from suffocation before reaching hospital. Causes of respiratory obstruction were foreign bodies, a swollen floor of the mouth, and backward displacement of the tongue. Mandibular fractures accounted for 75% of cases, the remainder being made up of the more severe fractures through the maxilla. A barrel bandage was the best emergency splint for the lower jaw. This could be followed by eyelet wiring if the teeth were in good condition or by cap splints if the dentition was inadequate for wiring. Edentulous patients should be immobilized by the use of Gunning splints. Fractures through the maxilla were more severe injuries and more difficult to treat. The lower jaw was too mobile to use as a splint. Cap splints on the upper teeth, fixed externally to a plaster head-cap, were the most satisfactory method of treatment. Nutrition should not be a problem in these patients: there was usually a gap between the teeth, but, failing that, an adequate fluid diet could be administered through the space behind the last molar tooth. Very careful attention to oral hygiene was vital. In conclusion Mr. Walker made a plea that such patients should be referred early to the dental staff so that treatment could be begun as soon as possible after injury.

Mr. E. C. B. BUTLER (London) asked how often osteomyelitis and parotitis complicated fractures of the jaw. Mr. WALKER replied that both had been rare since the introduction of antibiotics.

SECTIONS OF OBSTETRICS AND GYNAECOLOGY AND CHILD HEALTH

Tuesday, July 15

Problems of Neonatal Period

Dr. BERYL D. CORNER (Bristol), a vice-president of the Section of Child Health, occupied the chair at the joint session with the Section of Obstetrics and Gynaecology on problems of the neonatal period.

Obstetric Responsibility for the Handicapped Child

Dr. FRANCES BRAID (Birmingham) said that the paediatrician was confronted by many children handicapped by such disabilities as blindness, deafness, congenital heart disease, cerebral palsy, or mental deficiency. In most the origin of the disability was either unknown or beyond our control, but against others good obstetric care offered a major degree of prophylaxis. The possibility of rubella in early pregnancy causing congenital abnormality in the foetus might be reduced by the use of gamma-globulin, but the place, if any, for therapeutic abortion in these cases was still uncertain. Other virus infections appeared less dangerous in this regard. How often in this country toxoplasmosis damaged the foetus, especially its central nervous system, was unknown, but in the U.S.A. 30% of affected babies were said to be born prematurely, 27% of whom died; 12% of affected mature babies also died. Toxoplasmosis was transferred to the foetus only during the active phase of the maternal infection, so that later siblings were not affected. The outstanding example of the value to the foetus of good antenatal supervision lay in haemolytic disease of the newborn. Many babies were now being saved from death, and cerebral damage rarely occurred with proper management.

The incidence of prematurity, continued Dr. Braid, was rising (e.g., in Birmingham from 7.2% in 1945 to 9.2% in 1955), but in the majority of cases the cause of the premature birth was not known. Better antenatal care might be partly responsible, by prolonging a pregnancy beyond the 28th week or by intervening to prevent stillbirth. Better paediatric care of these small babies might increase the total number of surviving handicapped children, for cerebral palsy was more common in premature babies. The question whether babies who had early survived a threatened abortion had a high rate of abnormality remained to be answered. Turning to perinatal trauma, Dr. Braid said that primary traumatic cerebral haemorrhage was now rare, but haemorrhage secondary to asphyxia from any cause was less uncommon. Less than 10% of infants with cerebral disturbance at birth later showed evidence of brain damage, but it was impossible to foretell what residual damage might occur in an individual case.

A most exhilarating discussion followed to which Professor H. C. MCLAREN (Birmingham), president of the Section of Obstetrics and Gynaecology, Mr. W. G. MILLS (Birmingham), Mr. EDWARD COPE (Birmingham), Professor IAN DONALD (Glasgow), Miss ELSIE WARREN (Kensington), and Miss V. MARY CROSSE (Birmingham) contributed.

Neonatal Cold Injury

Dr. T. P. MANN (Brighton) discussed neonatal cold injury, a not uncommon disorder with a high mortality. It usually occurred after home delivery in winter when the outside air temperature was below freezing point. Deaths from this cause were almost entirely preventable, yet the yearly number of fatalities in this country might well exceed 100. The condition was often unrecognized, the causative exposure to cold being overlooked. Prematurity did not seem an important relevant factor, but predisposing factors included asphyxia at birth, birth injury, and infection. The usual presenting features were increasing apathy, refusal of food, and oliguria, but the infant, usually a male, did not look ill. Sometimes the mother had noticed that the baby had been cold to touch for several days, but in none of his cases had the severity of the hypothermia been appreciated before the baby was admitted to hospital. There was then noted severe hypothermia, oedema of the extremities, and skin erythema. A purulent nasal discharge was common, although sometimes not seen until after rewarming. Profound hypoglycaemia had also been found in a few cases. In two recent cases the platelet count had been low, which might have been related to a generalized haemorrhagic tendency. The outstanding finding at necropsy was pulmonary haemorrhage, sometimes mistakenly called "haemorrhagic pneumonia."

Dr. Mann concluded that, as treatment was often difficult in well-established cases, prevention was of paramount importance. Those conducting domiciliary confinements must be alert to the danger of cold exposure. In particular routine cleansing baths could be a menace in winter. Nursery temperature should not fall below 60° F. (16° C.) night or day in the early weeks. If the baby's temperature was recorded once daily, hypothermia would be detected early, and then rewarming was relatively easy.

Dr. W. N. LEAK (Winsford), Dr. H. L. ELLIS (Oxford), Dr. FRANCES BRAID (Birmingham), Dr. V. MARY CROSSE (Birmingham), Dr. A. J. MACLEOD (Outer Isles, Scotland), Dr. G. L. DAVIES (Brighton), and Dr. B. M. LAURANCE (Derby) spoke in the subsequent general discussion.

Respiratory Distress in the Newborn

Mr. H. L. SHEPHERD (Bristol), a vice-president of the Section of Obstetrics and Gynaecology, took over the chair when Dr. R. J. K. BROWN (Cardiff) discussed respiratory distress in the newborn. He said that, although it was still uncertain what made the newborn baby take its first breath, much had been learned about the circulatory adjustments that must also occur if its survival was to be assured. Much of this knowledge had been obtained by study of the changes occurring in the newborn lamb. The ductus arteriosus contracted partially after birth, yet permitted a considerable blood flow to the lungs from the aorta for some hours. In this way the expanding lungs obtained a plentiful blood supply during the critical phase of change-over from foetal to adult condition. Conversely, it had been shown that inadequate pulmonary ventilation might ultimately lead to shunting of blood away from the lungs through this open channel with accentuation of asphyxia. Pulmonary capillary erection might also assist the proper expansion of the alveoli at birth. Many believed that the added blood volume obtained from the placenta by delayed cord ligation assisted by gravity increased the output from the right ventricle by augmenting venous return.

There was strong evidence, Dr. Brown continued, that pulmonary hyaline membrane, the cause of many neonatal deaths, especially in premature babies and those delivered abdominally, especially from diabetic mothers, was of endogenous vascular origin. He himself thought it likely that early ligation of the cord in the presence of delayed onset of breathing was an aetiological factor. As general anaesthesia contributed to depression of the foetal respiratory centre, regional anaesthesia for caesarean section might be to the baby's advantage. It had also been suggested that hypoxia and sensory stresses at and soon after birth might stimulate the liberation of noradrenaline from the organs of Zuckerkandl to the enhancement of cardiovascular tone and the assistance of circulatory readjustments. A noradrenaline drip might therefore have a place in the resuscitation of the newborn; after all, many of the features of the syndrome of respiratory distress were characteristic of shock.

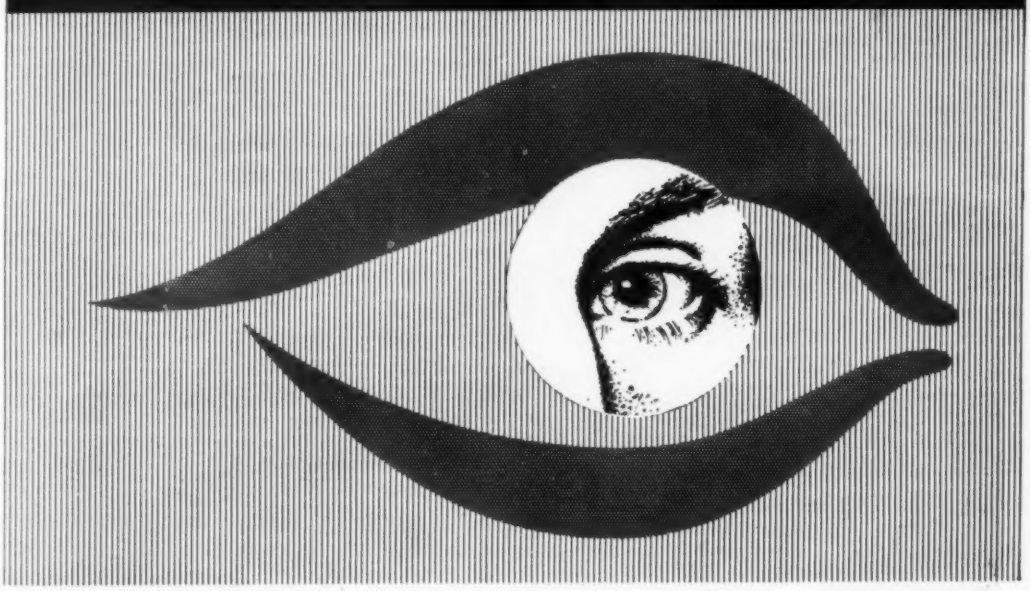
Dr. Brown concluded that the newborn baby had considerable tolerance to anoxia but very little to ischaemia. Thus successful resuscitation of the asphyxiated infant depended on rapid establishment of the adult type of circulation after birth.

Changing Fashions in Neonatal Resuscitation

Professor IAN DONALD (Glasgow) reviewed the changing fashions in the resuscitation of the newborn. From the

the antibiotic of choice

in a NEW presentation



ACHROMYCIN OPHTHALMIC OIL SUSPENSION 1%

has been specially developed to make the topical use of ACHROMYCIN tetracycline in eye infections even simpler and more effective. The Oil Suspension offers optimal dispersion of the antibiotic; it diffuses rapidly into the conjunctival sac, has less effect on visual acuity, and provides longer-lasting antibiotic effectiveness. This new form of ACHROMYCIN is acceptable in every sense — to patient and physician alike. The new plastic dropper-type bottle makes accurate dosage easy, and the preparation is virtually free from side-effects. Because the product is so effective and simple to use, the patient can co-operate fully in following the treatment prescribed. That is why ACHROMYCIN Ophthalmic Oil Suspension 1% is now the treatment of first choice in many common forms of eye infection.

ACHROMYCIN*

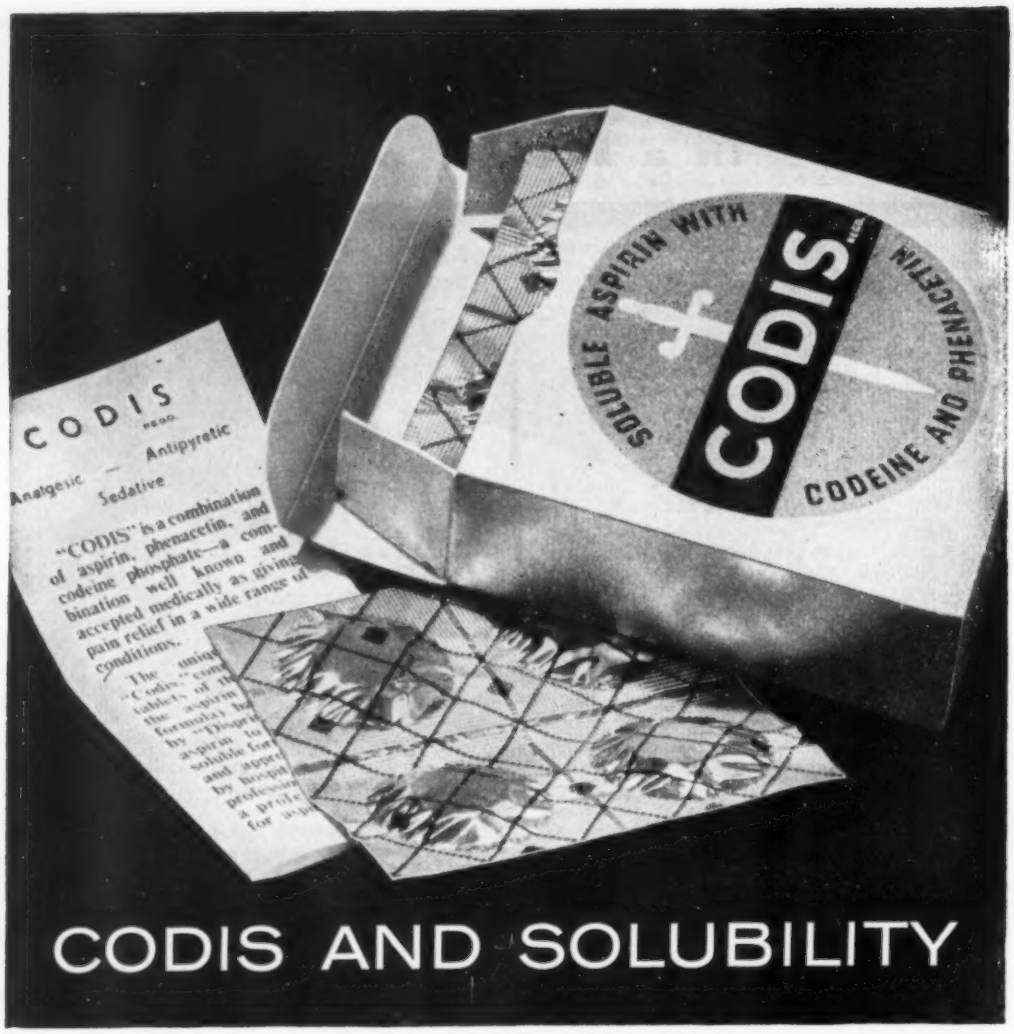
TETRACYCLINE

*REGD. TRADEMARK

OPHTHALMIC OIL SUSPENSION

Each cc. of ACHROMYCIN *Ophthalmic Oil Suspension contains Tetracycline HCl 10 mg.; Ethyl Cellulose 20 mg.; Tocopherol in Oil 34%; 0.0015 cc. Sesame Oil to 1 cc. In plastic dropper-type bottles of 6 cc.*

Lederle LEDERLE LABORATORIES DIVISION *Cyanamid* OF GREAT BRITAIN LTD., London, W.Q2


CODIS
Analgesic — Antipyretic
Sedative
"CODIS" is a combination of aspirin, phenacetin, and codeine phosphate—a combination well known and accepted medically as giving pain relief in a wide range of conditions.
SOLUBLE ASPIRIN WITH
CODIS
CODEINE AND PHENACETIN
CODIS AND SOLUBILITY

THE GREAT ADVANTAGE of Codis is that it provides a codeine compound tablet in which the aspirin content is soluble in water. (The codeine constituent is also soluble, and the phenacetin is in very fine suspension.)

This is achieved by careful compounding and preparation, resulting in tablets which are quickly absorbed and well tolerated—even in cases of proven intolerance to ordinary (insoluble) aspirin.

To ensure stability and easy identification, the tablets are wrapped in moisture-proof distinctive gold foils of 10 tablets each (dispensing size), or boxes containing five foils of 4 tablets each (public size).

CODIS REGD. **AVAILABLE FOR DISPENSING**

Not advertised to the public

Composition.

Each Codis tablet contains: Acid. Acetylsalicyl. B.P. 4 gr., Phenacet. B.P. 4 gr., Codein. Phosph. B.P. 0.125 gr., Calc. Carb. B.P. 1.2 gr., Acid. Cit. B.P. (exsic.) 0.4 gr.

For clinical samples and literature, please write to Reckitt & Sons Ltd., Pharmaceutical Department, Hull

various forms of stimulation applied to the baby fashions progressed to more or less forceful types of artificial respiration. Next came the attitude of watchful expectancy, favoured because spontaneous recovery was the rule. The results of any technique were difficult to assess because it was difficult to ascertain the exact cause of the respiratory distress in any individual baby. Intubation was valuable, but he doubted the efficacy of gastric oxygen. Professor Donald then traced the development of a respirator which automatically augmented any spontaneous breaths of the baby or made it breathe if its own respiratory efforts were absent. He concluded by demonstrating this respirator in action on a dummy.

In a discussion on the papers by Dr. Brown and Professor Donald, Dr. W. N. LEAK (Winsford), Dr. H. C. W. BAKER (Birkenhead), Professor H. C. McLAREN (Birmingham), and Dr. V. MARY CROSSE (Birmingham) participated.

SECTION OF ANAESTHETICS

Wednesday, July 16

Spinal and Epidural Analgesia To-day

With the president, Dr. B. L. S. MURTAGH (Birmingham), in the chair, Dr. J. D. ROBERTSON (Edinburgh) presented the case for spinal analgesia. After listing the advantages, it was admitted that many were no longer valid in the presence of modern methods of general anaesthesia. However, since the mortality and morbidity rates after spinal analgesia were no greater than after general anaesthesia, it was a pity that the fear of litigation had become such an important factor in choosing between these methods. In fact, by avoiding positive-pressure ventilation and consequent interference with pulmonary circulation the hazards of neostigmine-resistant curarization, and by reducing blood loss, a real claim for the benefit of spinal analgesia could be made. Dr. Robertson reviewed the neurological complications, and found that they rarely occurred in centres where spinal analgesia was common practice. Spinal analgesia was more certain and more predictable than epidural analgesia. With the ever-present risk of inadvertent dural puncture, epidural analgesia exhibited all the possible dangers of either method. On the basis of recent work it might be considered a technically more difficult and poorly controlled form of spinal analgesia.

Dr. C. J. MASSEY DAWKINS (London) then presented the case for epidural analgesia. He claimed that epidural block replaced spinal block, and did so equally efficiently without the well-known hazards of spinal analgesia. Hypotension was the only complication common to both. Technical difficulty in locating the epidural space was no longer a valid criticism of the method. This had been achieved by the introduction of the Brooks indicator, which combined the Dogliotti technique of the loss of resistance to an advancing needle with the Odom technique of recognizing the negative pressure within the space. With the Brooks indicator, which consisted of a glass balloon blown on the end of an Odom indicator, it should be possible to find the epidural space with certainty in 98% of cases.

Dr. Massey Dawkins suggested that, if unconsciousness was required, hexobarbitone and the breathing of air were less likely to interfere with respiratory physiology than the administration of gases in a doubtful mixture from an anaesthetic apparatus.

Since the vagus nerve remained intact, a block of this nerve might be necessary to avoid hiccup or coughing. With this single drawback epidural analgesia offered ideal operating conditions with benefits to patient, surgeon, nursing staff, and anaesthetist. Dr. Massey Dawkins concluded with a detailed description of his technique based on 2,000 cases, and indicated the extent of its usefulness.

Dr. J. ALFRED LEE (Southend) spoke on a critical evaluation of the methods. Such an evaluation was based on the manner in which an anaesthetic technique satisfied certain criteria. These criteria were efficiency, controllability, ease of induction, safety, and freedom from side-effects. General anaesthesia offered greater latitude than any form of local analgesia in terms of safety. But in skilled hands, and with proper care, spinal and epidural analgesia were as safe as general anaesthesia, and carried a lower mortality rate. The particular risks were undeniable, and hypotension and toxic reactions demanded treatment by an intravenous route. Thus an open vein—using a Mitchell or Gordh needle—was an essential prerequisite. Dr. Lee said that neurological complications, although not common after spinal analgesia, were virtually unknown after epidural block. In spite of these risks, both methods must be taught, and anaesthetists must be familiar with them. Technical difficulties should present no bar to their use, but personal preference must necessarily influence the choice of method.

In the discussion which followed, Dr. R. W. COPE (London) stated that the neurological risks of spinal analgesia were unacceptable. Dr. L. T. CLARKE (Birmingham) suggested that a full neurological and serological examination should be made before embarking on spinal analgesia. Dr. G. C. STEEL (London) thought that epidural analgesia offered the best solution to many anaesthetic problems. Professor W. W. MUSHIN (Cardiff) and Mr. BRIAN WILLIAMS (Middlesbrough) also took part.

Anaesthetists' Brains Trust

Under the chairmanship of Dr. H. W. FEATHERSTONE (Birmingham), questions submitted by members of the section were discussed by a panel consisting of Professor W. W. MUSHIN (Cardiff), Drs. T. C. GRAY (Liverpool), H. H. PINKERTON (Glasgow), J. GILLIES (Edinburgh), W. D. WYLIE (London), and V. J. KEATING (West Indies).

On the question of the use of chloroform, it was felt that it still had a place as an emergency anaesthetic, although it might be replaced by halothane. The panel were unanimous in believing that the general-practitioner anaesthetist had an important part to play in the hospital service. On economic and geographical grounds he was essential, but the manner of his employment and his training must be carefully regulated.

On the grounds of economy of gases, and also convenience, the use of soda-lime in a circuit using a high flow of gases was supported. It was thought unwise to rely on theoretical calculations for flow rates to avoid rebreathing. The use of soda-lime or a non-return expiratory valve overcame the risk of carbon dioxide retention, but members of the panel felt that too much attention was being paid to the presence of minute concentrations of carbon dioxide in anaesthetic circuits.

Steroids such as hydroxydione sodium succinate ("viadril") should be considered as agents producing basal narcosis rather than anaesthesia. They were of interest, but should not be regarded as the answer to all anaesthetic problems. Their value lay in the post-operative period, and this was probably of greater interest than their anaesthetic properties. The panel expressed divided opinions on the administration of suxamethonium and D-tubocurarine to the same patient. The effect of suxamethonium on the nerve endings probably persisted for many hours, but in the present state of our knowledge it was impossible to make a dogmatic statement on this problem.

SECTION OF ANATOMY AND PHYSIOLOGY

Monday, July 14

Posture and Health

In opening, the president, Sir SOLLY ZUCKERMAN (Birmingham), commented on how suitable was the subject of posture for discussion by the laboratory worker, anatomist, and clinician.

Sir RUSSELL BRAIN (London) opened the first symposium on some of the laboratory aspects of posture. Most modern work on postural physiology had been built on foundations

laid by Sherrington in his monumental work *The Integrative Action of the Nervous System*. The muscle spindles had now been shown to be influenced by their own efferents, the gamma fibres, establishing the concept of a "servo-loop mechanism" influencing the stretch reflex as well as Sherrington's lengthening and shortening reactions. Spinal and neuronal connexions had been traced and the physiological nature of excitation and inhibition was being elucidated. The parts played by the cerebellum, vestibular nuclei, and the central reticular formation had been profitably studied. Clinical observation had led to controversy over the role of the pyramidal pathways, and neurosurgery had been attempting to control abnormal rigidity in extrapyramidal syndromes. Disease might interfere with the foundation of posture at many points. Proper understanding necessitated a knowledge of the muscle spindles and their affection by normal and abnormal muscle states, the afferent impulses from them, interneurones and spinal-cord synapses, the efferent impulses, the myoneural junction, and the physiochemistry of muscle contraction. It was through these mechanisms that bad postures tended to be perpetuated. Superimposed were complex higher circuits involving all levels of the nervous system.

Ultrastructure of Muscle

Dr. H. E. HUXLEY (London) spoke on the ultrastructure of muscle studied by electron-microscopy and other new techniques. His paper was illustrated by electron-micrographs of exceptional quality. Each myofibril inside the muscle fibres consisted of a succession of overlapping longitudinal arrays of submicroscopic filaments. There were two types of array, thicker filaments about 100 Å diameter (1 Å$=10^{-8}$ cm.) and 1.5 μ in length composed of myosin, and thinner filaments about 50 Å diameter and length 2.0 μ composed of actin. In each array the filaments were spaced in a regular and parallel manner, the thicker lying about 450 Å apart in hexagonal fashion, muscle sarcoplasm filling the intervening space. The two types of array alternated along the length of each fibril, and in the overlapping region the thin filament interdigitated with the thick, forming a very regular double hexagonal array.

Muscle contraction was unaccompanied by shortening of either type of filament, but by a telescoping of the thin actin filaments between the arrays of thick myosin ones; the reverse process occurred during muscle relaxation. This appeared to be produced by a system of cross-bridges arising from the thick filaments and passing to the thin ones, seemingly drawing the latter along in a centipede-like motion. This "sliding filament" mechanism fitted in well with known biochemical concepts and could reasonably account for many physiological characteristics of striated muscle.

Spindle and Synapse

Professor RUTH BOWDEN (London), in a paper on the spindle and the synapse, first gave an illustrated summary of the distribution and morphology of sensory endings, particularly of spindles in striated muscles, and of the anterior horn cells with their complex synapses. She pointed out how often as many as 2,000 boutons terminaux made synaptic connexion with a single anterior horn cell. The functional significance of the multiplicity and variety of sensory nerve endings in striated muscle was discussed in the light of recent work by Granit, Merton, Eccles, Mountcastle, and others. Experimental evidence suggested that for limb muscles there was no afferent cortical projection pathway. Tendon organs and spindles appeared to exercise their inhibitory and excitatory functions primarily at cord level. Mountcastle had shown in cat experiments that columns of cortical neurones were not driven by the large group I muscle afferents, but certain cortical neurones were driven by afferents from joint capsules, ligaments, and periosteum. Simultaneous recording from cortical units driven by joint capsule afferents had shown that they might respond reciprocally to alternate flexion and extension of the joint. The apparent absence of cortical projection pathways from muscle spindles had posed a great problem in understanding the mechanism of cortical control of movement patterns. However, as joints were positioned by muscular activity, Mountcastle's findings in respect of afferents from joint capsules might lead to clearer understanding of postural control and movement.

Nervous Gradation of Muscle Contraction

Professor R. J. HARRISON (London), a vice-president of the Section, then took the chair and introduced Dr. PATRICK MERTON (Cambridge), who presented some aspects of the nervous gradation of muscle contraction. He reminded his audience that ideas on this subject were now undergoing revision because muscles, long believed to have given rise through their sense organs to proprioceptive sensations, were now again thought to be insentient. Helmholtz, in 1865, claimed to have proved the absence of position sense in eye muscles; but objections, irrelevant in Dr. Merton's view, were raised by William James and Sherrington, whose views had long prevailed. Many simple experiments could be performed to demonstrate the absence of position sense in skeletal muscles. For example, it was impossible for a subject to say accurately where was the tip of his anaesthetized tongue, although the tongue muscles were known to be plentifully supplied with muscle spindles. When the hand blood supply was cut off for 75 minutes by an inflated wrist cuff, the thumb became anaesthetic to touch or movement, but the terminal joint was not paralysed, for the flexor and extensor muscles of this joint lay proximal to the tourniquet. But no feelings of position or tension could be elicited by active or passive movement of the terminal joint. Hence our appreciation of thumb position and force of movement must be derived from the joints and skin, and not from the muscles.

Muscles were controlled through automatic servo mechanisms, whose feed-back elements were the muscle sense organs, thus ensuring that the muscles did what was required of them whether the instructions came from the higher postural centres or the motor cortex. Indeed, it would appear that the higher centres did not want to know what was happening in the muscles. The muscle sense organs, by feed-back action, therefore conferred special properties on the neuromuscular machinery, rather than provided data with which the higher centres elaborated the orders to that machinery.

Central Mechanisms of Balance

Dr. D. A. MCDONALD (London) then gave an interesting and amusing account of his experiments on the central mechanism of balance in relation to the righting movements of the falling cat. His talk was illustrated by high-speed cinematographs, some taken at the rate of as many as 1,000 frames per second to produce a most instructive "slow-motion" record of the sequence of body contortions in the falling animals. These body movements were of especial interest, as they involved the generation of rotation in a freely falling body. This was solved in the cat by flexion of the trunk and rotation of first the fore-part in its own axis and then the hind-part. Sequential rotation of smaller body sections, such as the head, did not seem to be physically possible in terms of the counterbalance of the forces necessary.

The dominant sense organs for informing the animal of its spatial position appeared to be the eyes. Professor J. B. S. HALDANE owned a venerable female cat which he assured Dr. McDonald suffered from congenital absence of the vestibular organs. Experiments with this borrowed "Haldane cat" proved that it turned over quite normally with its eyes open, but made no effort to right itself when blindfolded. A normal animal turned over just as well with its eyes blindfolded as with them open, except that the turn was slightly delayed and less perfectly executed.

Tuesday, July 15

Posture in the Living Subject

With a vice-president, Dr. A. C. CROOKE (Birmingham), in the chair, Mr. F. G. ALLAN (Birmingham) opened the discussion. Attempts to define the meaning of "good posture" were subject to individual interpretations. It could mean, for example, a posture which imparted an impression of radiant health, alertness, a sense of physical and mental well-being and even of beauty. Goldthwaite's definition of the head being held erect, chin drawn in, shoulders back, and abdomen drawn in was not, most people would agree, a very normal posture. But there were wide variations of posture within normal limits. What he liked to term "normal," "relaxed," and "military" postures were all examples within normal limits, although the "relaxed" posture probably most nearly approached a pathological stance. The posture of individuals was affected by mood and was also partly hereditary, being related to the body-type.

Remedial exercises aimed at developing muscles whose weakness was thought to cause the poor posture often had no permanent effect, but only corrected the postural faults during the actual voluntary performance of the exercises. If, however, a corrective plaster-of-Paris splint was applied for several weeks, during which time exercises were done only to prevent muscle-wasting, permanently improved posture followed the removal of the plaster. These results of treatment emphasized the importance, mentioned by earlier speakers, of stimuli coming from the joints and not from the muscles.

Electromyographic Studies

Dr. JACK JOSEPH (London) described electromyographic studies on the thigh and leg muscles in 25 males and 21 females and the hip muscles in 18 males of ages ranging from 18 to 42 years. He pointed out that if a very high amplification was used with either surface or needle electrodes the absence of electric potentials was very suggestive that the muscle immediately deep to the surface electrodes or in which the tip of the needle was lying was not contracting. This negative finding was stressed because of the results obtained in the investigations he was discussing.

The subjects were studied standing comfortably at ease, not tense, with the weight on both lower limbs, the feet about 12–18 in. (30–45 cm.) apart, the toes turned out at an angle of about 60 degrees, the hands clasped tightly behind the back, and the head held with eyes looking straight forward. In this posture it was found that in the great majority of subjects only the superficial calf muscles (soleus and gastrocnemius) were continuously active, although to a variable extent. The tibialis anterior, quadriceps femoris, hamstrings, iliopsoas, and glutei usually showed no detectable electrical activity. In the posture described, the perpendicular through the centre of gravity passed behind the line joining the centres of the hip-joints and in front of the line joining the centres of the knee- and ankle-joints. Both the hip- and knee-joints were so constructed that stability at these joints could be maintained without muscular activity, but in the case of the ankle-joint the body was prevented from tipping forwards by the continuously contracting superficial calf muscles.

Weight of Vertebral Column

Professor A. DELMAS (Paris) presented an illustrated paper on an original line of thought concerning the weight of the vertebral column and its relation to posture. There was a relation, he claimed, between the weight of vertebrae and posture. This statement depended on researches made on 30 sorts of mammals and 90 human subjects of each sex and of various races. After classifying vertebrae according to their position in the vertebral column, the weights showed irregularities and features which had been interpreted in a functional way. These features of the vertebral weight, raised or lowered in some vertebrae, had been studied and related to the magnitude (varying at each level) of the forces of pressure or traction.

The idea of relative weight had been introduced in this study by calculating the weight of each vertebra as a percentage of the total weight of the vertebral column. This idea had permitted the elimination of weight variation due to an increase in total body weight. This procedure enabled one to show the part played by vertebrae or by particular groups of vertebrae in maintaining the posture peculiar to the individual.

The weight of the vertebral body increased regularly from the 1st cervical vertebra to the 5th lumbar; on the other hand the weight of the posterior arch was very variable. Thus, in the human vertebral column, the heaviest vertebra, in all its parts, was not the 5th lumbar vertebra but the 3rd. It follows that the vertebrae below the 3rd, while of primary importance in the architecture of the static column, were not of similar importance in the maintenance of posture. A very well developed posterior arch was seen in the 2nd cervical vertebra, although this feature still occurred down through the first five thoracic vertebrae. On the other hand the posterior arches of the 3rd cervical vertebra and the 12th thoracic were hardly developed at all. These observations in man and those which had been noted in other species emphasized the functional importance of vertebral weights where certain individual features can be related to variations in posture.

Posture in the Schoolchild

The chair was then taken by Professor A. ST. G. HUGGETT (London), a vice-president, when Dr. CECILE ASHER (London) discussed posture in the schoolchild. Poor general posture in a child with no recognizable local defect was an indication for thorough physical examination and an investigation into his way of life. Postural variations or defects depended on the stage of the child's development, its age, body-type, and in some on faulty attitudes. Flat and everted feet could be regarded as normal in infancy and tended to disappear during the acquisition of postural reflexes and loss of the subcutaneous fat pad. Valgus ankle was a misnomer, as the ankle-joint was not involved. Common in early walking and unassociated with knock-knee, it often went with a high arch and gave a characteristic clinical picture. Any age or type of child was affected. Knock-knee was common under 5 years and commoner in stocky and obese children, slender children being more liable to overall postural defects. It appeared to regress with or without treatment. Lordosis, like knock-knee, was common in the obese, but it was normal in infancy when the pelvic inclination was more horizontal than in adults. Mesomorphic children had less lordosis and a better prognosis than endomorphs. Postural scoliosis in adolescents was often associated with poor overall posture.

"Good" or "correct" posture varied for different individuals and could not be standardized. Treatment should not be wasted on developmental phases but directed towards a particular end. We should remember that many athletes were flat-footed and kyphotic.

Lifting Weights

Dr. P. R. DAVIS (London) spoke on the posture of the trunk during the lifting of weights. Light weights could be lifted with the trunk in any position, but with larger weights the trunk was usually held somewhere between simple flexion and erect. With the heaviest weights it was normally held as straight as possible.

In the erect position the weight was mostly transferred from the arms to cervical and upper thoracic vertebrae. When stooping, the weight was transferred to a lower spinal level, and to a greater number of vertebrae.

Weight reaching the neck and acting in the long axis of the trunk was transmitted through the chain of vertebral bodies and intervertebral disks, little contraction of the spinal muscles being required. Lifting in the stooping posi-

tion, however, produced the following effects: (1) Strong spinal muscle contractions to counterbalance the flexing force exerted on the trunk by the load. (2) Longitudinal compression of the vertebral column by these muscular contractions. (3) Abdominal muscle contraction, which raised the intra-abdominal pressure. This pneumatic mechanism might indirectly extend the spine and so help support the weight.

Weight-lifting injuries could be divided into a spinal group and an extrusive group, the latter including lesions of the pneumatic mechanism such as herniae and prolapses. Damage in both these groups was in theory less apt to occur if weights were always lifted with the trunk held erect.

Posture in Industry

Professor G. P. CROWDEN (London) discussed the practical problem of posture in industry. Posture at work, he said, was one of many factors of physiological significance in relation to the working capacity, comfort, and health. Productive muscular effort involved dynamic and static components in varying proportions according to the nature of the task, the design of machinery, or the method of work performance adopted by the individual.

Movements of the body and limbs, and in particular the alternating contraction and relaxation of muscles in dynamic work, promoted the circulation in the working muscles themselves and in other anatomical structures involved in the performance of the task. On the other hand, continuous muscular contraction, whether due to static effort in work performance or in the maintenance of a strained posture, restricted the blood flow through the structures involved, and led to the rapid onset of fatigue, reduced capacity for work, and increased accident risk.

Examples were given by slides of bad and good postures adopted by men and women in industry while standing, sitting, and handling or carrying loads. It was pointed out that the basic physiological problem of defining optimal postures for work was the detection and subsequent reduction or elimination of static effort of long duration. The value of postural change during work and of varying the task performed was emphasized. While sickness absenteeism might come to the notice of the management, and the medical officer might deal with complaints of fatigue, backache, and other disabilities which might arise from postural strain at work, it was emphasized that the vital problem—namely, prevention—should be dealt with on the shop floor by engineers and others who were in charge of men as well as machines.

In his closing remarks Professor A. ST. G. HUGGETT (London) said how pleased he was to witness the happy symbiosis between the laboratory worker, comparative anatomist, and clinician on matters relating to the important problem of posture. He thanked all those who had given papers, particularly Professor A. Delmas, who had come so far, and the University of Birmingham for their loan of such excellent facilities for the meeting.

SECTIONS OF CARDIOLOGY AND THORACIC MEDICINE AND SURGERY

Tuesday, July 15

Chest Pain

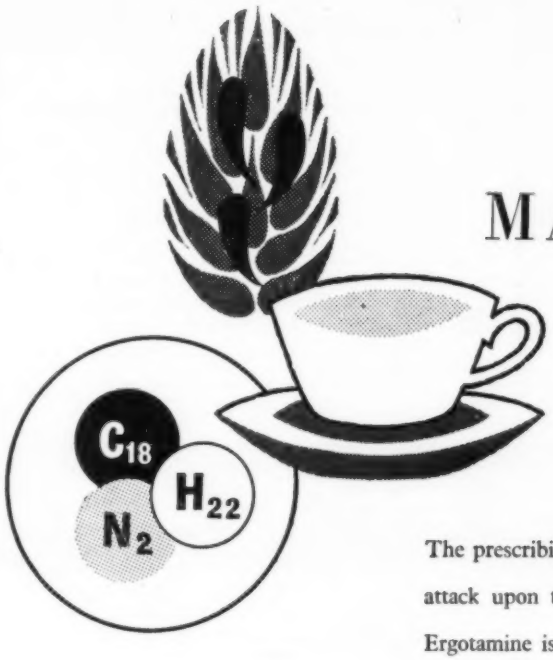
With the president of the Section of Cardiology, Dr. OSCAR BRENNER (Birmingham), in the chair, Dr. GRAHAM HAYWARD (London), a vice-president of the Section of Cardiology, opened a discussion on chest pain by describing ischaemic chest pain. It was difficult to be sure, he said, that chest pain ever arose in the absence of coronary atheroma except in paroxysmal arrhythmias and occasionally with valvular disease. Anaemia and thyrotoxicosis were aggravating factors in some patients, when treatment resulted in disappearance of the pain. The usual pathological changes in patients with ischaemic pain were narrowing of the coronary vessels and the development of intracoronary anastomosis. These anastomoses allowed coronary occlusion to take place without the advent of myocardial infarction. Patients with angina pectoris had often sustained one or more episodes of coronary occlusion, though the history did not suggest it.

Clinically there were three varieties of pain—angina pectoris, cardiac infarction, and acute coronary insufficiency. The diagnosis rested mainly on the history; the electrocardiogram had serious limitations. The pain was constrictive, and it was localized by the patient by laying the flat of the hand across the front of the chest. Even when the pain was unusual in distribution there was almost always a chest component. In cardiac infarction the pain built up to a maximum, was accompanied by shock, and often by cardiac arrhythmia. In angina, the pain occurred during exercise, but the occurrence of pain after meals sometimes caused confusion. In coronary insufficiency the pain lasted several hours but there was no shock. Clinical signs were often absent after infarction, but triple rhythm was sometimes heard. The initial electrocardiogram was often normal; definite changes might not occur for three days. Serial changes were most diagnostic. Occasionally acute abdominal conditions causing shock could give rise to minor alterations in the ST segments. The electrocardiogram in angina usually showed changes of ischaemia or infarction. If the tracing was normal at rest, it might alter after exertion, but there still remained a small group in whom the E.C.G. remained normal. Changes in the E.C.G. did not necessarily denote that the present symptoms were cardiac in origin. About 12% of symptomless men over the age of 50 had an abnormal electrocardiogram. The clinical history was the most helpful diagnostic aid.

There was no evidence that dietary treatment could influence established coronary disease. Myocardial infarction was best treated initially by morphine or pethidine. In the treatment of angina, trinitrin was the best drug, pentaerythrityl-tetranitrate less beneficial, and "marsilid" (iproniazid) sometimes helped. Induction of therapeutic myxoedema was indicated in ischaemic pain from aortic disease. Lumbo-dorsal sympathectomy relieved pain and probably helped the development of intercoronary anastomoses.

Dr. WILLIAM EVANS (London) condemned excessive zeal in treating hypertension and cardiac pain when there was often no real evidence of disease. The diagnosis of cardiac pain was often false. Several other conditions such as fibrositis and dyspepsia could closely mimic cardiac pain. About one-fifth of patients with chest pain were suffering from dyspepsia. Triple rhythm was an important physical sign in cardiac ischaemia; it was present in 80% of patients after myocardial infarction. The electrocardiogram had become the ultimate arbiter in diagnosis, but the tracing must be reliable and the criteria of normality strict. Reliance should be placed on the standard leads, lead III after full inspiration, and three chest leads. CR leads were preferred to V leads. The lesser recognized cardiographic signs of cardiac pain were: depression of the ST segment, a low T wave in lead CR4+CR7, blunt T waves, terminal dipping of the T wave, depression of the TU segment, inversion of the U wave, notching of QRS7, and the appearance of a Q wave in lead III after deep inspiration. Adherence to these strict criteria would save unwarranted invalidism from faulty diagnosis: a patient should never be made worse for seeing his doctor.

Dr. D. EVAN BEDFORD (London) contrasted the features of neurotic chest pain with those described by previous speakers. After Heberden had identified angina pectoris, other forms of chest pain were often held in similar dread. At one time the term "pseudo-angina" had been used. During the first world war it was realized that chest pain was common in young men. Organic heart disease was absent, and the name "effort syndrome" was introduced. In functional disorders the pain was below or above the left breast or over the left scapula. Radiation of pain to the neck and arm was not uncommon. The pain was intermittent and sharp, but left a persistent ache lasting hours



today's new MASTER PLAN *against migraine*

Each tablet contains ergotamine tartrate 2 mgm.; caffeine (alkaloid) 100 mgm.; cyclizine hydrochloride 50 mgm. In bottles of 10 and 100

The prescribing of 'Migril' makes possible at last a *planned* attack upon the three predominant symptoms of migraine. Ergotamine is present at strength in 'Migril' for its specific effect upon the characteristic headache and ocular disturbances. Caffeine is present too, since it acts as a synergist to ergotamine. Frequently, however, ergotamine tends to evoke nausea and vomiting on its own account and can therefore worsen these aspects of the condition. For this reason, the potent, rapidly acting anti-emetic cyclizine is also included in 'Migril'—to overcome any tendency to nausea or vomiting, whether caused by the ergotamine or by the condition itself. And so successfully does cyclizine achieve this aim that truly effective oral doses of ergotamine can today be given—by means of 'Migril'.

'migril' TRADE MARK

BURROUGHS WELLCOME & CO., LONDON
(THE WELLCOME FOUNDATION LTD.)

where antacids alone are unsatisfactory

RELIEVES SPASM

1. 'Merbentyl', an anticholinergic with virtually no belladonna-type side effects, effectively relieves the spasm. By decreasing peristalsis the antacids are enabled to exert their neutralising effect for a prolonged period.

REDUCES ACIDITY

2. Short acting magnesium oxide and long-acting dried aluminium hydroxide gel combine to provide the ideal antacid. There is no constipation or laxation.

KOLANTYL

does four good things in the relief of peptic ulceration

PROTECTS MUCOSA

3. Methylcellulose, a demulcent, is included to protect the damaged mucosa from further irritation by the gastric contents.

INHIBITS EXCESS ENZYME ACTION

4. Sodium lauryl sulphate inhibits the proteolytic enzymes lysozyme and pepsin. Excess lysozyme is frequently present in the vicinity of a peptic ulcer.

Merrell Research

'Kolantyl' is available as tablets and gel. Each tablet or 10 c.c. of gel contains:

Dried Aluminium Hydroxide Gel	400 *mg.*
Magnesium Oxide	200 *mg.*
'Merbentyl' (dicyclomine hydrochloride)	5 *mg.*
Methylcellulose	100 *mg.*
Sodium lauryl sulphate	25 *mg.*

PACKS:
Convenient rolls of 12 tablets in cartons of four or twenty rolls. 'Kolantyl' Gel in bottles of 12 fl. oz. The basic N.H.S. costs are 5s. and 23s. 4d.; of the gel, 6s. 4d. Purchase Tax additional.

DOSAGE:
2 tablets or 4 teaspoonfuls of gel three or four times daily.

'Kolantyl' and 'Merbentyl' are registered trade marks of the Wm. S. Merrell Company.

Distributed in the United Kingdom and Irish Republic by

RIKER LABORATORIES LIMITED · LOUGHBOROUGH · LEICS.

or days. Areas of tenderness could be elicited over the chest wall. The pain was aggravated by fatigue and emotional stress. Victims could exercise in spite of the pain, though symptoms often occurred at an interval after exertion. Other symptoms included dyspnoea (with a curious sighing respiration), exhaustion, palpitations, giddiness, and sweating of the hands and axillae. In civil life the symptoms were usually found in young adults and in middle-aged women with hypertension and obesity.

Differentiation from angina could be made on the clinical history. Neurotic ill-health should be diagnosed positively on the history and signs and not by exclusion. Patients required assurance about their general health as well as their hearts. Hysterical angina connoted symptoms which sounded genuine through the patient's acquaintance with the real symptoms from contact with sufferers from genuine disease. Vasomotor angina was probably the same as vasovagal syncope, and was characterized by prostration, pallor, a fall in blood pressure, and a sense of impending doom. It was almost certainly neurotic. Young patients with vague symptoms should not be referred to heart specialists, but in older patients full cardiological investigation seemed advisable.

Pleural Pain

The features of pleural pain were outlined by Dr. PAUL FORGACS (London), who affirmed that, though the lungs and bronchial tree were insensitive, the parietal pleura was particularly sensitive to pain. Pain from the chest wall, like pleural pain, was aggravated by coughing and breathing. Pain from the diaphragm could be referred to the chest, abdomen, or shoulder. Pain from the mediastinal pleura was not easy to recognize, since its features were not familiar and since pleural rub was not evident. Mediastinal pain was felt over the sternum in the mid-line and radiated to the neck; it was not aggravated by coughing or breathing. It was difficult to distinguish from the pain of pericarditis or coronary disease. The pain of tuberculous pleurisy often preceded the appearance of the effusion by many weeks. This provided a clinical guide in distinguishing tuberculous from simple sterile effusions. It was also of extreme importance, suggesting that the pain arose from a source of infection near the pleura. In some cases of chronic pleurisy the cause could not be determined; pleurisy could occur in the absence of any demonstrable abnormality in the lung.

Pain following operations on the chest was discussed by Dr. B. G. B. LUCAS (London). The reason for pain after thoracotomy was not fully understood. It seemed to vary with the patient's ability to withstand pain and with the site of operation. Pain was worst after operations on the lower and posterior parts of the chest. The pain often persisted for years; it bore no relation to opening the pleura at operation; and it was aggravated by post-operative dyspnoea. There were two groups of patients. The first group, with true intercostal neuralgia, responded to intercostal block with alcohol, phenol, or 50% ammonium sulphate. In the second group the pain was more diffuse and occurred over the operation scar. These patients were often introspective and difficult to treat. Some responded to infiltration of the painful site with ammonium sulphate. Early treatment was imperative. Of drugs, opiates gave most relief and did not depress inspiration. Morphine antagonists could be given at the same time.

Oesophageal Pain

Mr. R. H. R. BELSEY (Bristol), describing oesophageal pain, said that the commoner causes were oesophageal reflux, and trauma from foreign bodies, instrumentation, and corrosives. Malignant disease of the oesophagus was usually painless. Oesophageal reflux was more common than large hiatus hernia. In this condition the pain was burning and severe, though not intense. It was situated high in the epigastrium or over the lower sternum. The pain might be referred to the back, jaws, or down the arms; it was aggravated by stooping or lying down. True vomiting was rare and did not bring relief. Eating varied in its effect on the pain but often brought relief. Alkalis helped temporarily. The patients had good and bad periods, rather like those with peptic ulcer. Flatulence was constantly present because of the habit of constant air swallowing in an attempt to relieve the pain. The habit, and the flatulence, often persisted after operative cure. There was no satisfactory medical treatment for oesophageal reflux. Diagnosis depended partly on radiology, though barium examination did not always disclose the reflux. Oesophagoscopy was often very valuable in demonstrating the reflux. There was no correlation between the severity of the pain and the degree of oesophagitis. Sometimes intense pain was produced by oesophageal spasm when food became impacted. In childhood, oesophageal reflux caused great distress. It sometimes caused a curious exaggerated posture and crying. This sometimes led to an erroneous diagnosis of mental deficiency. The pain from large hiatus hernias was different. Here the pain was closely related to eating, unaffected by posture, and relieved by vomiting and belching. In most cases of oesophageal reflux the clinical history should lead to correct diagnosis.

Following the opening speakers, the PRESIDENT opened the discussion by commenting on the relative importance of history and cardiographic changes in the diagnosis of heart disease. It was to be remembered, he said, that an abnormal cardiogram did not necessarily denote a cardiac cause for the symptoms for which advice was sought.

Dr. W. S. HAYNES (Mombasa, Kenya) suggested the use of intravenous alcohol in the treatment of post-operative pain. Dr. G. I. WATSON (Peaslake, Surrey) gave a colourful description of the symptoms resulting from lemon drops impacted in the oesophagus and from sustained overexertion.

Dr. M. E. CHINNER (Adelaide, South Australia) drew attention to the occasional relief of anginal pain after tying the internal mammary arteries and from inducing therapeutic pericardial adhesions.

Dr. G. S. R. LITTLE (London), Dr. MACGREGOR (Croydon), Mr. TAYLOR (Birmingham), Dr. MAX HAMILTON (Leeds), Dr. WHITFIELD (London), Dr. DAVIS (Swansea), and Dr. ARCHIBALD FULLERTON (Batley) added to the stimulating discussion.

SECTION OF CARDIOLOGY

Wednesday, July 16

Treatment of Pulmonary Heart Disease

With the president, Dr. OSCAR BRENNER (Birmingham), in the chair, Dr. K. W. DONALD (Birmingham) opened the session with a paper entitled "Treatment of Pulmonary Heart Disease." Cor pulmonale developed in those who already had considerable disability from chronic bronchitis and emphysema. Sometimes asthma was also a complicating factor. These patients, having suffered from a superadded infection such as acute bronchitis or bronchopneumonia, quickly became seriously ill and the need for skilled treatment was urgent. When admitted to hospital they looked moribund, but if the initial treatment was skilled then many lives could be saved. The administration of oxygen was life-saving. Dr. Donald advised general practitioners to carry in their cars an oxygen cylinder and a loose plastic mask so that these patients could get oxygen while awaiting admission to hospital. The dangers of carbon dioxide narcosis had to be kept in mind, and the patients allowed out of the oxygen tent for 10 minutes each hour to ensure adequate ventilation of the lungs.

Among the other remedies Dr. Donald advocated were digitalis, antibiotics given intramuscularly, and aminophylline if any bronchial spasm was present. Emergency tracheotomy should be performed if there was an accumulation of mucus in the trachea. He claimed that in Birmingham this operation frequently proved life-saving. In the

speaker's opinion the newer diuretics such as chlorothiazide were superior to intramuscular mercurial preparations for the relief of oedema.

In the discussion Professor W. MELVILLE ARNOTT (Birmingham) stressed that carbon-dioxide narcosis caused the mental confusion so often seen in these patients. Mr. A. L. D'ABREU (Birmingham) confirmed the value of tracheotomy in urgent cases.

The Thyroid and Heart Disease

Dr. S. H. COOKSON (Bournemouth) then read a paper on the thyroid and heart disease. He confined most of his remarks to the effect of myxoedema on the heart, having reached his conclusions from a study of 36 patients with this disease. The diagnosis of doubtful cases could always be made from the electrocardiographic changes. These, he said, were a slowing of the rate, a reduction of voltage, and a flat or inverted T wave. Occasionally there was a prolonged P–R interval, heart block, and depression of the ST segment. These changes could be restored to normal within eight days with correct therapy. The blood pressure was raised in hypothyroidism, especially the diastolic reading. Dr. Cookson emphasized that the heart size was normal in 14 of his patients, while in the remainder considerable enlargement was present. Severe cases always suffered from the usual symptoms of cardiac failure.

Dr. W. BRIGDEN (London) said that thyrotoxicosis in adolescence must not be treated by surgery because of the ill effects arising from the resulting general endocrinal upset. Dr. K. W. DONALD (Birmingham) urged that cardiac catheterization be done to confirm the diagnosis in all borderline cases.

Myocardial Disease of Obscure Aetiology

Dr. BRIGDEN then read his paper entitled "Myocardial Disease of Obscure Aetiology." He included in this group damage to the myocardium by congenital fibrotic conditions, infections due to bacteria, viruses, and protozoa, collagen diseases, and amyloidosis. Nutritional factors complicated by alcoholic excess, beriberi, and lack of vitamin K were also contributing factors. The signs and symptoms were identical to those of ordinary heart disease, the most prominent symptom being excessive fatigue. The radiological appearances were characteristic, there being a generalized enlargement of the heart with no pulmonary oedema. Electrocardiographic changes could not be relied upon for diagnosis: the usual changes suggested infarction. Prognosis was poor, with sudden death frequent.

Professor MELVILLE ARNOTT reported that over 50% of all cardiac diseases in the Union of South Africa fell into these categories.

Surgical Treatment of Congenital Heart Disease

The Section then heard a paper by Dr. C. G. PARSONS (Birmingham) concerned with the selection of children with congenital heart disease for surgical treatment. He dealt with persistent ductus arteriosus, coarctation of the aorta, and atrial septal defect, being mainly concerned with the advice that should be given to the parents of these children about operation. The decision to advise operation could be reached only after carefully weighing up all the evidence in each individual case. Each recommendation would depend not only on the signs and symptoms and the results of the investigations but also on the ability and experience of the surgical team. 10% of all babies admitted to the Birmingham Children's Hospital because of heart disease had persistent ductus arteriosus. Without operation half of these infants would die in the first year of life. Operation was therefore advised as early as possible. 90% of babies with coarctation of the aorta died, and operation should therefore be attempted as soon as all facilities were available. When the diagnosis was made in older children, operation must be undertaken before puberty. Atrial septal defect had a relatively good prognosis and could exist without symptoms even in the elderly. The average life expectancy was 37 years. Operation should be advised only if symptoms developed.

Mr. I. HILL (London) described all the surgical methods which could be used to correct these congenital conditions, illustrating diagrammatically with slides the technical aspects of each operation. Later he stressed the value of hypothermia in reducing the mortality of cardiac operations. He thought that the future for cardiac surgery was bright.

Dr. E. M. M. BESTERMAN (London) stressed that when an infant suffered from persistent ductus arteriosus operation must be undertaken before cardiac enlargement had occurred even if there were no symptoms present. Dr. R. GIBSON (London) reported a series of 70 cases operated on for atrial defects with only six deaths. Those who died had other complications. Dr. J. LEIGH COLLIS (Birmingham) agreed with all the practical points raised by Dr. C. G. Parsons.

SECTION OF GENERAL PRACTICE

Wednesday, July 16

Changes and Trends

With the president, Dr. H. W. DONOVAN (Birmingham), in the chair occasional papers were heard and discussed.

Women in General Practice

Dr. ANNIS GILLIE (London) spoke of the opportunities for women in general practice. Women had been in this field of medicine for over half a century, and there were now probably some 2,500 women general practitioners. Two types could be recognized—the "woman for women" type who had almost exclusively female patients and the real family doctor who looked after the whole families: with time this was the trend.

In general practice there was great scope for a woman to practise medicine to the full: her normal family duties as a wife and mother need not greatly interrupt her professional work. A questionary some years ago showed that the loss of women general practitioners from retirement was less marked than of women in other branches of medicine. The entry of women into general practice seems to be maintained and even increasing. In 1957, of all the new principals in England and Wales, 817 in all, 95 (or 12%) were women.

Changes in Paediatric Practice

Dr. A. BEAUCHAMP (Birmingham) gave a personal review of the changes in paediatric practice over the past 30 years. These changes had been notable and numerous, yet some conditions remained unaltered. The catarrhal child was still with us and the vogues of vitamins and removal of tonsils and adenoids had not solved the problem. As always, it was far more important to look at the child as a whole rather than merely at the tonsils. Acute infections of the throat and ear were still as numerous, but much less dangerous and severe. Acute chest infections, on the other hand, seemed to be much more frequent.

Whereas 30 years ago osteomyelitis was an almost weekly occurrence, now, Dr. Beauchamp said, he had not seen a case for six years. With better conditions of feeding and hygiene marasmus and rickets had been controlled, but summer diarrhoea still occurred. Infectious fevers were much altered. Scarlet fever was no longer a specific disease, diphtheria was never seen, and the complications of measles were mild and infrequent. Congenital abnormalities had increased quite significantly, and no good reasons could be given for this.

The reasons for these dramatic improvements in child health were, he considered, three: better public health measures, more enlightened teaching of medical students, and new and powerful drugs. It had always to be remembered, however, that even in the past children recovered from the majority of common and acute infections—unnecessary abuse of the specific antibiotics should be avoided.

Acute Infection of the Ear, Nose, and Throat

Mr. CHARLES GLEDHILL (Northampton), speaking as an E.N.T. consultant, discussed the common problems of aural and nasopharyngeal infections as he saw them. Otitis externa was a difficult condition to treat. Accurate diagnosis was first necessary, with swelling and inflammation of the skin lining the meatus. It was usually a bilateral skin infection caused by bacteria of the pyocyaneus–coli groups. The best treatment was local cleansing followed by applications of hydrocortisone and neomycin ear-drops. In treating acute otitis media great care was necessary to follow up all cases until the drum and hearing returned to normal. Any abnormalities required expert advice. Haphazard use of broad-spectrum antibiotics was very dangerous, and penicillin was still the drug of choice.

Pansinusitis was usually caused by penicillin-sensitive organisms, and penicillin was again the first choice together with vasoconstrictive nasal drops. Allergic rhinitis was common and a most difficult problem. He found the old-fashioned deep cauterization of the turbinates most helpful.

Local antibiotics were dangerous in acute throat infections, as generalized moniliasis was a risk. For quinsy he used emergency tonsillectomy under penicillin cover.

Chronic Rheumatism

Dr. L. J. BARFORD (Reigate) discussed the management of the common rheumatic problems in general practice. Empirical measures were the bases of all therapy. These were relief of pain by heat and analgesics, rest, and prevention of deformities and maintenance of muscle tone. In addition to these, local injections of hydrocortisone were now extremely useful in cases of osteoarthritis of knees and hands, tennis elbow, the carpal tunnel syndrome, and subdeltoid bursitis. In spite of all that had been written of its dangers, he still found phenylbutazone a most useful drug in ankylosing spondylitis and chronic gout. Above all else, and much more important than this galaxy of therapeutic measures, was the sympathetic encouragement of the individual patient.

SECTION OF NEUROLOGY AND NEUROSURGERY

Wednesday, July 16

Neurological Disorders in Childhood

With the president, Professor BRODIE HUGHES (Birmingham), in the chair, Dr. LUDO VAN BOGAERT (Antwerp) opened a discussion on neurological disorders in childhood by a review of acute encephalitis. He defined encephalitis as "a morbid process, inflammatory in nature and occurring within the brain, and developing in the presence of a living infective agent acting locally." He stressed the importance of early recognition of encephalitis, particularly when it accompanied or followed specific fevers. If, in a patient with an exanthem, constitutional upset was unusually severe, this often indicated an incipient meningo-encephalitis.

Recognition of Encephalitis

Dr. van Bogaert went on to describe the clinical features of meningo-encephalitis and underlined the importance of obtaining specimens for virological examination. This was particularly important in the first stage (that of viraemia) before neurological symptoms developed. The second febrile phase of the illness, in which the disease process might be largely localized to the nervous system, was easier to recognize clinically. In the early stage there was a pleocytosis in the cerebrospinal fluid, but later there was cyto-albuminological dissociation. A full understanding of many clinical and pathological features was necessary for the elucidation of some of the unusual clinical and pathological entities which had been described. For instance, Dr. van Bogaert suggested that some cases of acute serous exudation within the brain represented simply an early phase of encephalitis and should be included in this group even in the absence of "cellular" evidence of inflammation. He went on to discuss the syndromes of brain-stem encephalitis, sero-haemorrhagic encephalitis, and the various types of cerebral venous thrombosis, which may be clinically similar, in the light of the pathological changes which had been described in such cases. He closed by mentioning briefly the prognosis of childhood encephalitis and methods of treatment which could be utilized in such cases.

The Hypertonic Child

Dr. PAUL SANDIFER (London) said that the title of his communication, "The Hypertonic Child," did not adequately define what he proposed to talk about, as he intended to deal with the general problem of infantile stiffness. The stiff baby was one whose joints did not move, nor could they be moved, with normal freedom. The cause of the stiffness or deformity might be local, in or around the joints, and might then be "fixed" or structural. This type of fixed contracture of the limbs was seen in infants with arthrogryphosis, but might also occur in childhood as a result of polymyositis or myositis ossificans. Alternatively the cause of the stiffness might lie far distant from the joints where restriction of movement was most apparent; it might in fact be in the nervous system. In such cases the stiffness was generally "unfixed" or postural.

An important cause of stiffness and deformity in the lower limbs was spinal birth injury, a condition which was often difficult to recognize when present in mild degree, but more often the causal lesion was in the brain. These children were generally referred to as "spastics." However, in cases of cerebral palsy, spasticity of the limbs was not invariable; some cases were disabled by rigidity of extrapyramidal type and some by involuntary movements, while in others the diplegia was initially flaccid in type.

Dr. Sandifer went on to discuss in detail the clinical features and differential diagnosis of these conditions; he pointed out that early diagnosis was important not so much because of prospects of effective treatment but rather in order to give the parents an accurate prognosis. In cases of all types there was generally a history of cerebral insult sustained in the perinatal period, and subsequently delay in the development of motor skills became apparent. Many diverse symptoms and signs of focal cerebral and cerebellar or brain-stem lesions might be present in such cases, a fact which increased the difficulties of differential diagnosis in early life.

The Hypotonic Child

Dr. JOHN WALTON (Newcastle upon Tyne), speaking on "The Hypotonic Child," said that few problems were more difficult than the differential diagnosis between the causes of generalized hypotonia of the skeletal muscles in infancy. The diagnosis of amyotonia congenita had fallen into disrepute, since some had used this term to describe all cases with hypotonia developing at or shortly after birth, assuming concurrently that such a syndrome carried an invariably favourable prognosis, a conclusion which was far from the truth. To others this diagnosis foretold, on the contrary, a progressive downhill course, an event which was certainly the rule in progressive spinal muscular atrophy. However, this view failed to take account of that small group of hypotonic children who recover.

In fact, the syndrome of early infantile hypotonia might result from a variety of disease processes, some grave, others benign. The commonest cause was progressive infantile spinal muscular atrophy (Werdnig–Hoffmann disease), in which paralysis and hypotonia became progressively severe and death eventually ensued. In a second large group of cases the muscular hypotonia is a symptom of a variety of muscular, neuromuscular, cerebral, nutritional, metabolic, and skeletal disorders. The third and smallest group, to which the name "benign congenital hypotonia" had been applied, was one in which improvement was the rule, some patients recovering completely, while in others some degree

of muscular weakness and hypotonia persisted throughout life. Dr. Walton stressed the importance of recognizing cases in this latter group and discussed in detail differential diagnosis by clinical means and also the place of electromyography and muscle biopsy.

Hydrocephalus

Mr. G. H. MACNAB (London) read a paper on "Hydrocephalus in Infancy." He said that much had recently been learned about the natural history of hydrocephalus. His colleague Dr. K. M. Laurence had studied a series of 186 children with hydrocephalus who had been fully investigated, but had not undergone surgical treatment, during the period from 1936 to 1956. Over 40% of the children survived, with natural arrest of the hydrocephalus, and 42% were of normal intelligence, with intelligence quotients of 85 or above.

In Mr. Macnab's series of cases, one-third were found to have meningomyeloceles, and in these cases it was common for inflammatory adhesions to block the aqueduct of Sylvius or the foramina of the fourth ventricle. The Arnold–Chiari malformation also caused distortion and adhesions in the region of the cisterna magna. Dr. Laurence, in the analysis of 100 post-mortem examinations, found that only in 14% of cases was hydrocephalus due entirely to congenital malformations; infection accounted for 47%, haemorrhage for 24%, and tumour for 4%, leaving 11% unaccounted for.

Mr. Macnab then went on to show a film demonstrating the insertion of the Spitz–Holzer valve—a valve with a unidirectional flow used to drain cerebrospinal fluid from a cerebral ventricle into the superior vena cava at a set pressure of 50 mm. of water. Special silicone material which formed the valve and catheters prevented coagulation of the blood. This technique was the first successful method yet devised of carrying formed cerebrospinal fluid directly into the blood stream. Over a two-year period Dr. Spitz had now inserted 212 valves, with 96% successful results. Mr. Macnab had now personally inserted 29 successfully.

Intracranial Tumours

In the unavoidable absence of Mr. R. CAMPBELL CONNOLLY (Birmingham), Dr. H. G. MILLER (Newcastle upon Tyne) read Mr. Connolly's paper on "The Diagnosis and Management of Intracranial Tumours in Childhood." He discussed the pathology of these tumours, illustrating his talk with slides which demonstrated the macroscopic appearances seen at operation and also histological changes discovered on biopsy or at necropsy. The differences in incidence of the different types of intracranial tumour in children and in adults were stressed. In children there was a relatively high proportion of gliomas of low-grade malignancy, and benign neoplasms were uncommon. In adults, a considerable proportion of gliomas showed a high degree of malignancy, but on the other hand innocent tumours such as meningiomas and acoustic neuromas were more common.

Mr. Connolly then gave a brief description of the symptoms and signs of intracranial neoplasms, mentioning features which were characteristic of the different types of growth. In differential diagnosis, the conditions which tended to give rise to particular difficulty were otitic hydrocephalus, tuberculous meningitis, and encephalitis. In summarizing the indications for special investigations, including lumbar puncture (which had a very limited place in view of its dangers), electroencephalography, pneumoencephalography, ventriculography, and angiography, Mr. Connolly showed a number of illustrative radiographs. He concluded by considering briefly prognosis and methods of treatment, with particular attention to pre-operative management, the scope of operation and radiotherapy, and aftercare.

Mr. J. M. SMALL (Birmingham), Dr. B. S. B. WOOD (Birmingham), Dr. A. L. WOOLF (Birmingham), Dr. W. A. ZALESKI (Bromsgrove), Dr. H. L. ELLIS (Oxford), Dr. HELEN E. DIMSDALE (London), and Dr. B. M. LAURANCE (Derby) contributed to the discussion.

SECTIONS OF PSYCHIATRY AND SOCIAL AND PREVENTIVE MEDICINE

Wednesday, July 16

Care of the Mentally Ill

The two Sections held a joint meeting under the chairmanship of Dr. ELIOT SLATER, president of the Section of Psychiatry, to discuss "Home, Hostel, or Hospital? The Care of the Mentally Ill." Professor A. QUERIDO (Amsterdam) opened with an account of the Amsterdam domiciliary service, which, he said, has now been running for 25 years, and which at present cares for about 3,000 patients in their homes. These patients would to a large extent probably need hospital treatment in the next two years, if the service suddenly ceased to exist. To explain how it worked he sketched out the mental health services of Amsterdam, since the domiciliary service is only one strand in the net. Amsterdam has no mental hospital of its own, and its people requiring such treatment are dispersed among the mental hospitals of Holland, where they occupy one bed in eleven, which is nearly the ratio of the city population to the total in the country. However, the City University Hospital and the Protestant University Hospital between them have about 300 beds for psychiatric cases for observation, investigation, and brief treatment.

Psychiatric First-aid Service

The pivot of the organization is a day-and-night psychiatric first-aid service, with an experienced male nurse and a psychiatrist always available, and a staff of 10 psychiatrists and 25 social workers to draw on—the staff who also work the domiciliary service. Any patient thought by a family doctor or a specialist, or by the police or other public or social agency, to be in need of admission to hospital for psychiatric reasons is signalled to the first-aid service, and the duty psychiatrist then visits the patient on the spot, wherever he is, and decides on disposal. He may organize admission to one of the two general hospitals, or he may call in the domiciliary service, which will continue a series of home visits, giving guidance and support and sometimes material aid.

The service does not give any psychotherapy (and hence neurotics are not accepted but referred to the special centres), nor does it give drugs: medication remains the responsibility of the family doctor. What it does is show interest, practical help, and general guidance to the family. The service also accepts patients on discharge from the University Hospitals, where they may have spent up to two months, and gives them on the average two to three years' supervision. It also accepts patients discharged from the mental hospitals, where the average length of stay has been reduced to six months.

Thus two-thirds of the service's patients are schizophrenics and others are organic cases (senile, encephalitic, paralytic, feeble-minded) or "psychopaths." The aim is to teach these chronic sufferers to be aware of their disability and to learn to live with it in the community. This saves the community money, and it is an excellent vehicle for mental health education.

The Mental Hospital and the Community

Dr. T. P. REES (London) followed with a brief survey of the changes in the functions of mental hospitals since the Act of 1808 authorized the building of public asylums. In the nineteenth century the asylum was to protect the public, like the prison: to-day it was a hospital for treating mental illness. At the same time, the pattern of all disease had changed. First the diseases of malnutrition had to be conquered, then the infections: now the mental illnesses were the challenge, and rapidly becoming a preoccupation of the medical officer of health. 40% of all N.H.S. hospital beds were in mental hospitals, and 1 person in 40 dies there. One man in 19 and one woman in 14 will be an in-patient.

In oedema of cardiac origin

✻

'Neptal' brand mercuramide with theophylline is both quick and effective in action. A few hours after its administration there is a greatly increased flow of urine due to reduced reabsorption of water, sodium, and chloride from the renal tubules. This effect is of established value in controlling pulmonary and peripheral oedema and ascites associated with cardiac failure. It may also be used to reduce body weight in the obese patient in whom there is a hydropic tendency with sodium chloride retention.

'Neptal' may be given intramuscularly, or orally according to individual circumstances. Other parenteral methods are sometimes employed. When a constant diuresis is desirable, the intervals between injections may be prolonged by the interim administration of the oral preparation and a substance such as ammonium chloride which enhances its diuretic action.

'NEPTAL'
trade mark brand
MERCURAMIDE WITH THEOPHYLLINE

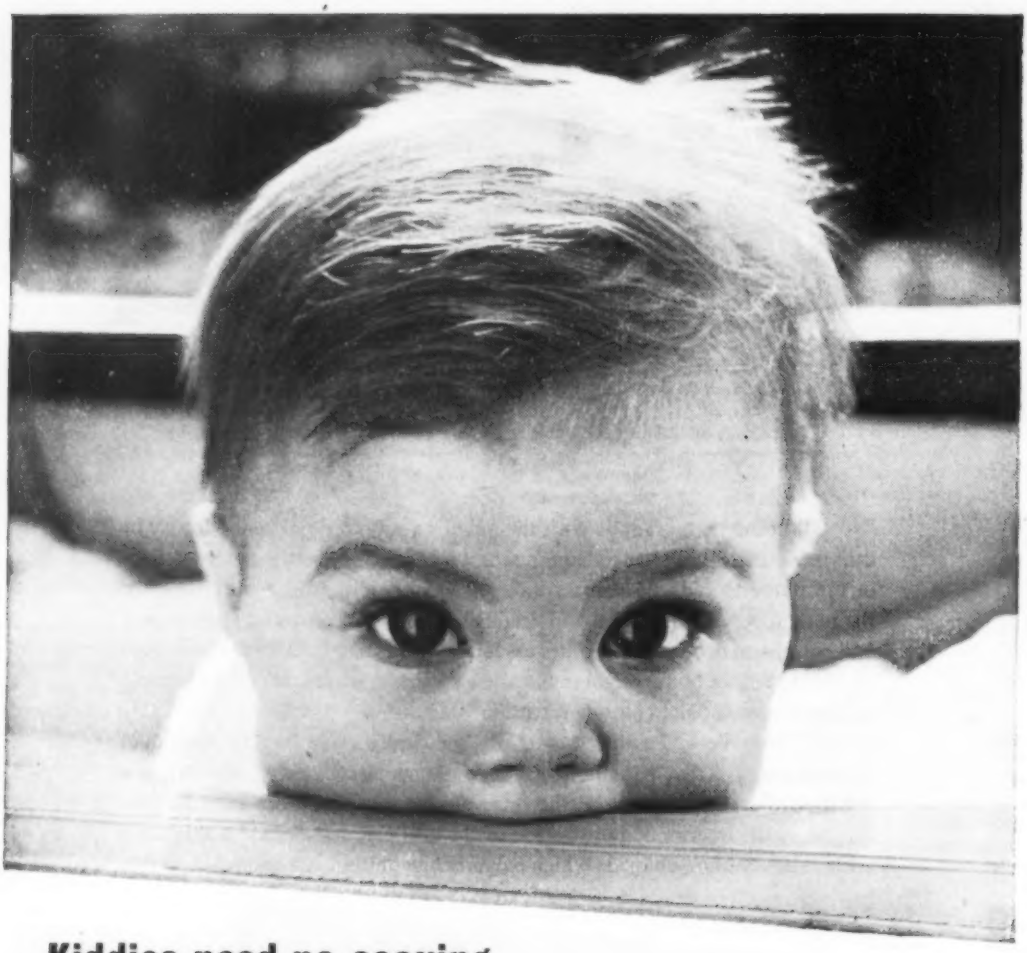
SUPPLIES
Solution for injection in 1 c.c. and 2 c.c. ampoules (each c.c. contains 92 mg. mercuramide and 45 mg. theophylline.)
Tablets each containing 160 mg. mercuramide with 80 mg. theophylline.

AN M&B BRAND MEDICAL PRODUCT

MANUFACTURED BY
MAY & BAKER LTD

DISTRIBUTORS
PHARMACEUTICAL SPECIALITIES (MAY & BAKER) LTD · DAGENHAM · ESSEX

MA3050A



Kiddies need no coaxing with this new form of Achromycin V

Here's an entirely new form of ACHROMYCIN V especially designed to simplify the control of infection in children and infants. ACHROMYCIN V Pediatric Drops Aqueous—delightfully flavoured with orange—make a particular appeal to the child who turns awkward when it's time to take his medicine.

The product contains ACHROMYCIN tetracycline with citric acid and sodium citrate for more rapid absorption and higher levels of the antibiotic in the blood.

Thus infection can be promptly controlled and the child's recovery accelerated. Accurate dosage can be measured drop by drop from the pliable plastic bottle (5 mg. of tetracycline per drop). The product can be given directly onto the tongue or added to water or fruit juice.

ACHROMYCIN V*

TETRACYCLINE WITH CITRIC ACID AND SODIUM CITRATE * REGD. TRADEMARK

PEDIATRIC DROPS AQUEOUS

Supplied in dropper-type plastic bottles of 10 cc.

Lederle LEDERLE LABORATORIES DIVISION Cyanamid OF GREAT BRITAIN LTD., London, W.C.2.

Dr. Rees said that the old-style asylum produced fresh illness in the patients, institutionalization, and it was not only the patients but also the medical and nursing staff who developed this form of mental rigidity. The World Health Organization had advised that the mental hospital doctor should spend one-third of his time working out in the community. He wanted to see more part-time consultant appointments to mental hospitals, more out-patient clinics, especially in the evenings, and especially clinics for treatment as opposed to diagnosis. It was often very bad for neurotics to stop work and come into hospital. They should be able to get brief psychotherapy after working hours. At the same time he hoped that the majority of the mentally ill would continue to be looked after by their family doctor.

Needs of the Mental Hospital Patient

Dr. C. R. LOWE (Birmingham), speaking on "The Needs of the Present Hospital Population," said that, even if the schemes propounded by the previous speakers were fully applied, hospital admission was still going to be needed in the future, even for social reasons (people living alone, or in slums, or with unsuitable relations). To clarify the diverse kinds of hospital services likely to be required, he, Professor T. McKeown, and Dr. F. N. Garratt had made a study of the needs of the 3,555 mental in-patients of Birmingham in January last year. They found that 45% of these people needed no medical treatment, a further 42% needed only maintenance treatment, and only 13% were having active treatment and investigation in the same way as the patients in an acute general hospital. Again, only 8% were in bed, and two-thirds needed no nursing of any type. One-quarter were capable of doing productive work, yet only 10 were leaving hospital during the day to do a job, and occupational therapy amenities were far from adequate. It was clear that 12% of these patients were in hospital for social reasons, and could just as well have been in a hostel. The exact figures would clearly change with changing circumstances, such as better out-patient services, but Dr. Lowe thought the survey showed the need for diversity. Plans of the future should envisage different kinds of unit, hostel, acute ward, geriatric centre, and so on. Should they be geographically separate or built round a general hospital?

Opening the discussion, Dr. C. A. H. WATTS (Leicester) said that his county, Leicestershire, had 12 psychiatrists, and would need 30 if a version of the Amsterdam scheme were to be started. The alternative was to give general practitioners better undergraduate and postgraduate training in psychiatry so that they could do more and do it better, and to see that they could call on all the paramedical services (social workers, etc.) for help and collaboration. The patient discharged from hospital, whether general or mental, had to be given back his self-confidence and self-esteem and brought back into the community and everyday life. He was looking in the wrong direction if the hospital doctor and the hospital psychiatric social worker managed his aftercare.

Dr. B. MANDELBROTE (Gloucester) said that in the provinces, as distinct from London, the mental hospital was the natural hub and focus of the mental health services. He criticized Dr. Lowe's analysis, as did Dr. T. P. REES later, because it had equated nursing duties in general hospitals with mental nursing, whereas the mental hospital required nurses who could live with and talk to the patients in the right way. Dr. E. S. STERN (Warwick) thought Dr. Lowe's survey completely unrepresentative of mental hospitals in general, and therefore not a basis for planning. He hoped the future was not going to be the kind of "hospital city," cut off from everyday life, a little world of its own, as Dr. Lowe had suggested.

Dr. M. J. BROOKES (Shrewsbury) wanted to know why a recent commission in Denmark had asked for more mental hospital beds. Dr. R. A. LAMBOURNE (Birmingham) put in a plea for more use of the existing political, church, tennis, and other clubs, and collaboration with teachers and parsons in rehabilitation, rather than creating more hospital out-patient clubs and employing more paramedical workers. Dr. M. P. NELSON (Somerset) wondered whether the public were now adequately safeguarded, and what was the effect on the family of having psychiatric cases in the home. To the second point Professor QUERIDO replied that they had found that children were not upset by psychotic parents, but it was neurotic parents who did the damage. To the first, Dr. T. P. REES said it was humanly impossible to prevent all escapes, whether from prison or Broadmoor, though the latter had a good comparative record. But the vast majority of psychiatric patients were inoffensive, and we had to be careful to balance the ill effects of repression on them against the possibility that through greater freedom one or two individuals might commit crimes.

SECTION OF OCCUPATIONAL HEALTH

Wednesday, July 16

Routine Medical Examinations

The president, Dr. R. S. F. SCHILLING (London), took the chair and in his introductory remarks said that in industry in Great Britain routine examination of workmen had been accepted as essential. Experience, particularly in the U.S.A., had raised three questions in connexion with this aspect of industrial medicine: (1) Were the industrial medical officers making the best use of their time? (2) Were they using the right techniques for the assessment of disease and of skill for work? (3) Were hospital techniques suitable for the investigation of normal persons?

The Adolescent

Dr. R. E. SMITH (Rugby) then read a paper on the examination of the adolescent. This was based on his experience of 20 years as a medical officer to two large schools for boys and to a college for trainee female teachers. At Rugby School each boy was carefully examined on entry and the parents were provided with a detailed history of the boy's previous illnesses. Thereafter no routine medical examinations were carried out. Reliance was placed entirely on getting every boy really well after an illness. Any boy who had been ill during the vacation was examined on return to school to ensure that recovery was complete. At Laurence Sheriff School the procedure was different. There entry examinations were carried out, followed by periodical examinations at two-yearly intervals. He described poor eyesight and dental caries as the main bugbear, and these required special arrangements. Among the subjects which he had specially investigated were tuberculous infection, otitis media, and undescended testicles. He preferred Mantoux testing and B.C.G. vaccination to mass miniature radiography. The stethoscope, he thought, was outmoded. He was convinced from careful observation that the testicle often descended spontaneously at puberty and that interference by surgeons or endocrinologists before puberty was usually meddlesome. As to the discharging ear (which was one of the main problems), he had found that practically every case could be cleared up by drying with pledgets of sterile cotton-wool. At the onset this toilet was sometimes necessary every hour. Persistence of discharge was usually due to infected tonsils or maxillary sinuses. His conclusion was that effective treatment of illness when it occurred was superior to routine examinations.

Transport Drivers

Dr. P. A. B. RAFFLE (London) read a paper on the medical aspects of the selection and supervision of persons whose work involved public safety as exemplified by London Transport bus drivers. As an indication of the importance of the subject he recalled that the British Medical Association and the World Health Organization during the past five years published memoranda on medical standards for

such transport drivers, and these standards adequately covered most situations which involved public safety. He stated that the main criteria of fitness to drive a passenger vehicle were: physical capability for handling controls, good visual acuity and colour vision, and absence of all diagnosable conditions apt to cause sudden collapse or excessive fatigue. Careful progressive recording and assessment of the medical history of individual drivers were important. Dr. Raffle enumerated 12 causes of loss of consciousness in drivers, and among these he emphasized idiopathic epilepsy, because it might not appear until middle life, epileptiform seizures due to cerebral metastases complicating bronchial carcinoma, and laryngeal vertigo (cough syncope) in cases of chronic bronchitis. He outlined the scheme of selection and examinations for drivers in London Transport. Analysis of 18,003 pre-employment medical examinations showed that 5.3% of candidates were rejected on general medical grounds and a further 13.3% by reason of substandard vision or colour vision. He commented that patients and private doctors did not regard with due seriousness such conditions as cardiovascular disease and chronic otitis media, which was always a potential cause of aural vertigo. Continuous medical supervision was achieved by periodical examinations at certain ages, following absence on account of certain specific illnesses, and in cases of absence of 28 days or more.

Dr. Raffle focused attention on coronary artery disease. Because of considerable liability to recurrence, this was an absolute contraindication to the continued employment of a driver in this capacity. Coronary disease was usually discovered through sickness absence: electrocardiographic examination did not, at present, enable examiners to detect those who would develop this condition. He referred to a matter of great public interest—namely, diseases which might be suddenly disabling or fatal. During the quinquennium 1953 to 1957, 89 drivers were suddenly stricken and died on the day of the episode. Of these 11 were actually at the wheel at the moment of crisis: six accidents followed, but none involved personal injury. In conclusion he was of opinion that assessment of fitness for particular occupations after sickness was probably more important than routine examination.

Industrial Executives

Dr. O. B. SCHREUDER (Pan American World Airways System, New York) discussed the place of routine examinations in the promotion of health among industrial executives. He stressed that the employee was one of the most valuable assets in any company, and, of the employees, the management group or executives were particularly valuable because of their training, motivation, and high degree of technical and administrative skill. Accordingly the conservation of the health of the executives was an essential part of any occupational health service. He stated that the objective was best achieved through periodical examinations preferably carried out by the industrial medical officer. The main purpose of these examinations was the detection of disease in the early stages while the possibility of remedy existed. To succeed the scheme must have the full support of management. As to the content of the periodical examination, Dr. Schreuder listed these items: a comprehensive history; thorough physical examination, including detailed examination of vision, inspection of the fundi, and determination of ocular tension; palpation of the peripheral blood vessels; and rectal examination. Laboratory investigations should include urinalysis, haemoglobin estimation, E.S.R., blood sugar in persons over 40 years of age, radiographic examination of the lungs, and electrocardiographic examination if over the age of 40 years; other more specialized tests according to indication. In a recent consecutive series of 120 periodical examinations in the management group of Pan American Airways significant defects were discovered in approximately 50% of examinees. The most common ailments were metabolic diseases, including obesity and diabetes, cardiovascular conditions, such as hypertension and gastro-intestinal diseases, including parasitic infestations (due to visits to the tropics) and peptic ulcers. Dr. Schreuder directed special attention to the problems of stress and strain. In conclusion he underlined the supreme importance of careful, frank discussion of findings and counselling of each examinee.

A lively discussion, in which many members participated, followed the papers. The main subject of this was the ethical considerations which attach to examination of executives.

COMBINED MEETING OF SECTIONS OF SURGERY, MEDICINE, AND GASTRO-ENTEROLOGY

Wednesday, July 16

Peptic Ulcer

Making some opening remarks from the chair, Dr. E. BULMER (Birmingham), a vice-president of the Section of Medicine, said that as no important advances in the medical treatment of peptic ulcer had been made in the last 35 years it was unlikely that much time would have to be devoted to that aspect of the problem.

Dr. F. AVERY JONES (London) introduced the subject, and pointed out that peptic ulcer, though a common illness, was one which varied tremendously in its severity. Many patients had relatively little trouble from their ulcers, with only a bout of indigestion once or twice a year which quickly responded to routine treatment. In his experience about 25% of cases fell into this category. Diagnosis was usually easy, but there were many pitfalls. Importance should be attached to the periodic and recurring nature of the pain, which might be experienced only in the back, substernally, in the right iliac fossa, or in the suprapubic region.

Duodenal ulcers differed from gastric ulcers in many important respects. For example, in gastric ulcer the incidence was excessive in the labouring classes and low in the professional classes. As to causation, Dr. Avery Jones thought that so far as gastric ulcer was concerned ordinary wear and tear of the gastric mucosa might be important. In contrast, in duodenal ulcer there was the factor of high acid output and hypertrophy of the parietal cells, the latter feature being in part of a hereditary nature. The food habits, and in particular the type of food the patient ate, were of importance, and alcohol was well known to be an aggravating factor also.

Smoking and Ulcers

In a personal series of cases he had been able to show that tobacco-smoking delayed the healing of ulcers. If the patients were to stop smoking 83% of the ulcers showed significant healing by two-thirds or more in extent within one month. Certain drugs also aggravated peptic ulcer, including aspirin, steroids, and phenylbutazone. There was an unduly high incidence of chronic bronchitis among ulcer patients. Finally, emotional factors were well known to be important, and unless attention was paid to these the results of treatment might be poor. Rest in bed was an important part of treatment, for this increased the likelihood of the ulcer healing. Alkalis should be given for the relief of pain, but it was the speaker's impression that these and other drugs were not essential when the patient was free from symptoms, and indeed a complicated treatment regime for ulcers could be positively harmful, particularly when the patient had obsessional tendencies.

Dr. C. N. PULVERTAFT (York) drew attention to the striking geographical differences in the incidence of peptic ulcer which had been reported in several countries, notably India and Nigeria. In this country it had been found for some time that duodenal ulcer was more common in Scotland and the north of England than it was in the south of England, and that the disease was more prevalent in towns and cities than in country areas. He had made a study of peptic ulcer as it occurred in York and the surrounding

country between 1952 and 1957, each new patient being recorded. It emerged that the mean annual incidence per population at risk for the whole area was, for men: gastric ulcer 0.58, duodenal ulcer 2.25; for women the corresponding figures were 0.32 and 0.66. Perforations occurred in only 7% of the women patients as opposed to 13% of men patients, and in the case of the latter both gastric and duodenal ulcers were found to be more frequent in the town than the surrounding country. It was calculated that the expectation of developing a peptic ulcer in males over the age of 10 was 0.258% per year. A comparison was made between his series and a recent analysis of post-mortem records of peptic ulcer made in Leeds, and a good correlation for duodenal ulcer especially was observed, though it was also noted that the gastric ulcer rate was higher in Leeds than in York. The speaker also pointed out that there had been a recent slight fall in incidence of duodenal ulcer in York, and this trend had also been noted by other observers in London and Aberdeen. The cause of the higher incidence in town than in country was obscure, but it was thought to be unlikely to be due to the higher tempo of urban life.

Role of Gastrectomy

Mr. HERMON TAYLOR (London) spoke of the role of gastrectomy in the treatment of peptic ulcer. He stressed that the loss of the greater part of the stomach was a serious blow to general well-being and digestive efficiency. It was justified by its curative effect upon the ulcer and freedom from subsequent anastomotic ulcer. In contrast, in his experience gastro-enterostomy was associated ultimately with a 30% incidence of recurrent peptic ulcer. This had only become evident over fifteen years, and it would not be revealed if the follow-up period was brief. The results of the addition of vagotomy must have regard to this.

Partial gastrectomy was not associated with recurrent ulcer, but a price had to be paid in the occurrence in some patients of post-operative symptoms of which dumping was the best known. This was due to the loss of the pylorus and could therefore follow any form of gastrectomy. The symptoms of fullness, faintness, and weakness were due to the sudden distension of the small intestine with food: they could always be avoided, therefore, by not taking large meals, with restriction of fluids during a meal. Symptoms that did not respond to simple rules at mealtime were not due to dumping: they were due to obstruction at the anastomosis, with distension of the afferent loop with bile. This was brought about by sharp angulation at the junction of the afferent loop and the gastric remnant. Acute distension of the afferent loop in the immediate post-operative period was the cause of rupture of the duodenal stump, which could be fatal: later, it was the cause of vomiting of bile which troubled many gastrectomy patients. The antecolic anastomosis added a special obstructive effect of its own in some cases owing to the liability of small gut to slip behind the anastomosis.

There was a variety of operations which could be used to correct afferent loop obstruction. However, it need not occur. Mr. Taylor described a retrocolic type of gastrectomy with a gastroplasty procedure designed to avoid the obstructing angle. In his hands there had been no deaths with this operation, and no patients subsequently complained of bile vomiting or any serious degree of dumping.

Mr. R. L. HOLT (Manchester) briefly reviewed the various operations which could be performed for chronic peptic ulceration. The chronic gastric ulcer could often be handled well by performing the Billroth I type of procedure. In his opinion, for chronic duodenal ulcer, gastro-enterostomy combined with vagotomy was as good as partial gastrectomy. Indeed, in some respects it might be the better operation of the two, as digestion was relatively good and weight and energy were more likely to be maintained. The operation was successful in 89% of his cases by Visick's grading. Both operations, however, were followed by similar side-effects—for example, diarrhoea, "dumping," anaemia, loss of weight, and lack of energy. These were mostly due to undigested food passing quickly from the stomach to the jejunum, and there undergoing incomplete digestion from faulty mixing with digestive secretions. To overcome this difficulty Mr. Holt had combined vagotomy with partial excision of the pyloric sphincter (anterior pylorectomy). The incision was made in the pyloric region at right angles to the long axis of the gut, and about two-thirds of the pyloric sphincter and any anterior ulcer were excised. If a posterior ulcer was present, the edges were approximated by sutures. The early results had been excellent. The mortality rate had been 1% only, and this death was due to pulmonary embolism. Side-effects were infrequent and there had been no case of recurrent ulceration and only occasional bilious vomiting. Female patients had done particularly well. The speaker criticized the combination of vagotomy with a limited gastrectomy of the Billroth I type. The aim of this procedure had been to obtain achlorhydria, but in his opinion this was unnecessary and must inevitably be accompanied by a definite even if small mortality.

Professor F. A. R. STAMMERS (Birmingham) commented on the gradual diminution in popularity of partial gastrectomy in the treatment of chronic duodenal ulcer. Follow-up studies had revealed failure to gain weight and an increased incidence of pulmonary tuberculosis associated with poor nutrition. The overall failure rate was in the region of 10–12%. Not every patient was psychologically suited to this operation, and the "dumping" syndrome, stomal ulceration, and absorptive failure from mechanical causes were all recognized hazards. The precise aetiology of the "dumping" syndrome had not yet been clearly defined, but distension of the afferent loop, hypovolaemia, hypokalaemia, and hypoglycaemia had all been incriminated. Occasionally there was also a mechanical effect when an overlong afferent loop connected as a sump. He had observed cases in which adhesions had formed between the jejunum and the spleen and liver, and the sharp angulation of the bowel so caused had given rise to obstructive features. It was important always to ensure that the afferent loop was short. When a partial gastrectomy was carried out, it was possible to leave a hiatus between the anastomosis and the transverse colon through which either jejunum or omentum might prolapse, with resulting acute intestinal obstruction. The surgeon should ensure that this gap was closed at the original operation.

Opening the discussion, the chairman, Dr. E. BULMER (Birmingham), indicated that in his experience definitive surgery for duodenal ulcer would be necessary in about 5% of cases, but when a partial gastrectomy was performed the long-term results were poor in 10% of patients. In reply to Dr. E. H. L. HARRIES (Birmingham) and Dr. G. WATKINSON (Leeds), Mr. HOLT stressed that all his cases were tested for the effectiveness of vagotomy with the insulin hypoglycaemia test, and that a careful search was made to ensure that all branches of the vagus nerve had been cut. He had found his operations satisfactory in the treatment of manifest bleeding from a chronic duodenal ulcer, but did not advise vagotomy when haemorrhage was thought to originate from multiple gastric erosions.

ROUND-TABLE CONFERENCES

SMOKING AS A CAUSE OF DISEASE

The contrast in thought on smoking between the sixteenth century and to-day—in the light of the contemporary association of tobacco with lung cancer—was commented on by Professor H. SCARBOROUGH, professor of medicine at the Welsh National School of Medicine, at the Round-table Conference on the subject of smoking, held at Birmingham University.

In the sixteenth century, he said, tobacco had been regarded as a panacea for almost all ills. Tobacco leaves

were applied to wounds and tobacco smoke to the rectum. Later, in 1665, the boys of Eton had been encouraged to smoke as a prophylactic against the plague, and those who did not do so were severely beaten.

Professor Scarborough was presiding over a panel consisting of Dr. ERNEST BULMER (senior physician, United Birmingham Hospitals), Mr. W. H. BOND (radiotherapist, United Birmingham Hospitals), Dr. C. R. LOWE (lecturer in social medicine, University of Birmingham), and Professor W. MELVILLE ARNOTT (professor of medicine, University of Birmingham).

The CHAIRMAN, having introduced the members of the panel, asked them to state their own smoking habits. Professor ARNOTT said he smoked a pipe—and a cigar when he was given one. Dr. LOWE described himself as a "converted character"; he had smoked when he had been a "wealthy general practitioner" but could not afford to do so since becoming an "impoverished university lecturer." Dr. BULMER said he had given up smoking three or four weeks ago, when he had been asked to become a member of the panel. Mr. BOND said he had been a pipe-smoker for two or three years. The CHAIRMAN described himself as "a moderate smoker of cigarettes."

The proceedings consisted of answers by individual members of the panel to a series of written questions sent up from the audience, the first of which was: "How do you regard the evidence which has been produced about the dangers of smoking in regard to tuberculosis and chronic bronchitis?"

Dr. LOWE said he regarded it with horror. It was that sort of evidence that had put him off cigarettes. He accepted without any reservation that there was a proved association between cigarette-smoking and cancer of the lung, chronic bronchitis, tuberculosis, peptic ulcer, coronary thrombosis in middle life, and certain forms of cancer of the bladder—the sort of association that indicated that, if people did not smoke, a substantial proportion of deaths from those causes would not occur.

Dr. BULMER agreed. He regarded the evidence as overwhelmingly in favour of causal relationship between smoking and, pre-eminently, cancer of the lung, constituting a danger such that, if it were associated with an occupation, would make it virtually impossible to secure any employees unless they were paid princely danger money. Mr. BOND, "in defence of pipe-smoking," said that emphasis in that connexion must be placed on cigarette-smoking.

Summarizing the views of the panel, the CHAIRMAN said there appeared to be evidence of causal relationship between smoking and carcinoma of the lungs and bladder but no connexion with any other form of malignant disease.

Efficiency of Smokers

To the question, "Does smoking interfere with mental and/or physical efficiency?" Dr. LOWE said he knew of no statistical evidence on the point. Some people became depressed when not smoking and smoked to bring themselves up to the mean; it was thus an addiction rather than a habit. Dr. BULMER had a strong feeling that smoking diminished intellectual and mental energy; on the other hand, increasing age could also account for that. Mr. BOND considered that mental and physical efficiency depended first on the physical effects of continuous irritation of the conjunctivae and throat. An addict had *got* to have a cigarette before he was up to what he recognized as his mental efficiency. The CHAIRMAN said that an American survey on that aspect had disclosed no difference between the mental efficiency of smokers and non-smokers.

Professor ARNOTT said it could be demonstrated that respiratory efficiency was not the same in smokers as opposed to non-smokers; in the case of smokers the lungs had a lower capacity with higher residual volume; the amount of work which a smoker performed in breathing was significantly higher because smoking was an irritant, causing some swelling of the bronchial lining and narrowing of the bronchial tubes, and therefore an increase in the resistance to the passage of air. On the other hand, many people employed smoking as a trigger device to stimulate the emptying of the rectum at a time convenient to themselves.

The panel was next asked to explain why asthma sufferers claimed that smoking eased their attacks. Dr. LOWE said he had not heard that claimed, but bronchitics did say that a cigarette helped to cut the phlegm, "and if you live in a semi-detached house next to an addict there is no doubt about it." Dr. BULMER doubted whether such a claim in relation to asthma had been proved.

Turning to the question of whether any kind of smoking was harmful to non-smokers close by, Dr. LOWE said he was unaware of any such evidence, while Dr. BULMER thought the question was a very wide one because the degree of proximity had not been specified. Pungent pipe smoke could be very annoying, and it might be asked whether it was good thing to be in the atmosphere of a cinema when the air was blue with smoke when the lights came on. Mr. BOND said it depended on which of two factors involved was regarded as the most important—the chronic bronchitic-producing effects of cigarette smoke or the carcinogenic content. If chronic bronchitis was accepted as a factor in the production of lung carcinoma, then the person next to the smoker was in fact suffering. He thought that probably the carcinogenic content might be too low to be significant. The smoker was getting the carcinoma and the person next door was getting the bronchitis.

The panel was next asked whether, in view of the infrequency of lung cancer 25 years ago—before the days of motor- and diesel-fumes—it did not appear probable that the causal relationship was between smoking and the total amount of noxious particles inhaled, smoking being perhaps the most important. Mr. BOND said that the evidence of lung carcinoma was not higher among those working continually in petrol fumes.

Dealing with the question of whether cigarette-smoking could cause amblyopia, Mr. BOND said that the high incidence of that complaint which the Belgians had experienced after the war had been associated with the use of home-grown tobacco containing the central stem of the leaf; this was not present in the imported, prepared product.

The question, "Is there any evidence of a connexion between smoking and coronary thrombosis?" was first dealt with by Dr. LOWE, who described the findings of a questionary filled in by 12 Birmingham general practitioners on the subject in relation to male patients of 60 and over. This showed that the evidence of chronic bronchitis and peptic ulcers was appreciably higher among cigarette-smokers than non-smokers or those using pipes. Coronary thrombosis also was higher among cigarette-smokers, but it was interesting to note that the blood pressure of smokers was consistently lower than that of non-smokers.

How Can Doctors Help?

The CHAIRMAN said that the panel's next task would be to consider how people could be discouraged from smoking, if it was considered to be a bad thing, particularly young folk.

Professor ARNOTT said that the doctor's most effective means of helping his patients was by example. It was wrong for any practising physician to smoke in the presence of his patients. It was up to every doctor who was a cigarette-smoker seriously to consider whether, in the interests of his profession and his duty to humanity at large, he should either give up smoking them or do so only in private. Dr. BULMER thought that that was putting it a little strongly; it would convert doctors into "secret smokers." Certainly every doctor should seriously consider whether he should not refrain from smoking in public; what he did in his private life was nothing to do with his patients. Mr. BOND said the "attack" should be made from childhood, by giving the right example to children.

Dr. LOWE thought there should be some positive action by the Government as well as at personal level. The

'RAUWILOID'
is essential for Hypertension

'Rauwiloid', a purified and standardised fraction of Rauwolfia serpentina alkaloids, can be considered a basic treatment for hypertension. It lowers blood pressure more effectively than phenobarbitone or its combinations with theobromine and is less likely to cause depression than reserpine.

IMPORTANT

'Rauwiloid' may require more than a week for a significant anti-hypertensive effect to develop. Any previous treatment, particularly barbiturate, should be gradually reduced over this period.

In Mild to Moderate Hypertension

In most cases 'Rauwiloid' will provide adequate control by itself. Combination therapy is not necessary.

In Moderate to Severe Hypertension

When a greater hypotensive effect is required, 'Rauwiloid' should be combined with veratrum in the form of 'Rauwiloid + Veriloid'. 'Veriloid' is a biologically standardised alkaloidal extract of Veratrum viride. Such a combination with 'Rauwiloid' enables adequate doses of veratrum to be given for a satisfactory hypotensive response. (See detailed literature).

In Severe or Malignant Hypertension

'Rauwiloid' used in conjunction with ganglionic blocking agents enables a smaller dose of the more potent medicament to be used, thereby minimising side-effects and decreasing the tendency for tolerance to develop.

'Rauwiloid' is available in 2 mg. tablets in bottles of 60 and 500. Dosage, two tablets at night.

RIKER

'Rauwiloid' and 'Veriloid' are registered trade marks

Registered Users

RIKER LABORATORIES LIMITED

LOUGHBOROUGH, LEICS.

when prognosis is doubtful

In serious childhood infections, it is heartening to know that the full clinical effect of Chloromycetin is available as Suspension Chloromycetin Palmitate. Children who cannot swallow capsules readily accept this pleasant liquid preparation.

SUSPENSION CHLOROMYCETIN PALMITATE

(CHLORAMPHENICOL)

Indicated in the treatment of: early Pertussis, Laryngo-Tracheo-Bronchitis, Staphylococcal Pneumonia, Infantile Gastro-enteritis, Meningitis, and urinary tract infections.

Each teaspoonful containing the equivalent of 0.125g. Chloromycetin. Supplied in bottles of 60 c.c.

PARKE, DAVIS & CO. LTD. *(Inc. USA)*, HOUNSLOW, MIDDLESEX. TELEPHONE: HOUNSLOW 2361

1009

important thing was that people should be given the facts—then they could make themselves sick if they wanted to—but so far the facts had not been given.

"I think the Government should come out from behind the 'smoke-screen' that tobacco addicts have put up, and be honest about it," he said. It was quite wrong that smoking should be permitted in public places such as cinemas and restaurants or on public transport. Furthermore, the tobacco industry was not blameless. "We are submitted to a constant barrage from television, the cinema, and advertisements to smoke." "There should be some control over advertising," he said. It was also very bad that people in the Forces, at a young and impressionable age, should be encouraged to smoke by being given cheaper cigarettes to smoke when they were hanging around bored.

Professor ARNOTT reminded the conference that the Government raised between six and seven hundred million pounds a year through tobacco revenue and that there was no alternative commodity which could supply such a sum through taxation. Salt—a popular fiscal weapon in India—was impossible for such a purpose in an island so rich in salt deposits as Britain. All sensible people must be extremely sorry for the tobacco manufacturers and their associates and agencies throughout the world. As great industrial concerns, the tobacco industries had a splendid record of bringing prosperity to many areas which now depended heavily on them.

Mr. BOND said there were all sorts of preparations to help people stop smoking, from tablets to silver nitrate mouthwashes, but the best means of discouragement was the whispering campaign—"You are a fool," sort of thing. To call people "addicts" was also a good thing; equally effective was the term "cigarette drunkard." Another way of looking at it was to point to the surgery door and reflect that once a year it opened to admit somebody who would be dead in a month of lung cancer, but that if nobody smoked it would open only once every ten years to admit such a person. Dr. BULMER thought that the only hope was for a process which would remove the carcinogenic substance from tobacco.

Professor ARNOTT said he had the feeling that tobacco did not contain any carcinogenic agent at all but that the carcinogenic effect was caused by prolonged and sustained irritation, just as light would cause irritation of the skin, or as a varicose ulcer, prolonged and sustained over the years, would become malignant. The dream of getting a specific compound which could eliminate the carcinogenic element and render the whole process entirely free from risk did not seem biologically credible.

"What, if any, are the ill effects of stopping smoking?" was the last question before the panel. Dr. BULMER thought that the chief ill effect was "a most horrible, self-righteous priggishness." (*Laughter.*) Mr. BOND said that was the only real effect that did arise.

The CHAIRMAN said that many who gave up smoking suddenly in middle age ate a great deal more as a result and put on weight; he sometimes wondered whether they were not going from Scylla to Charybdis. Dr. BULMER thought that such an effect was only temporary. Dr. LOWE said there was some evidence that people did put on weight when they stopped smoking. Weight was also related to evidence of coronary disease and one or two other complaints. It was possible that by stopping smoking a person laid himself open to coronary disease, but there were no data on this.

THE RIGHT AGE FOR PLANNED SURGERY

Dr. D. V. HUBBLE (Derby), a vice-president of the Section of Child Health, took the chair at this conference, in which members of the audience proposed questions to a panel comprising a thoracic surgeon, Mr. A. L. D'ABREU (Birmingham), a genito-urinary surgeon, Mr. INNES WILLIAMS (London), a paediatrician, Dr. J. APLEY (Bristol), a general surgeon, Mr. A. GOUREVITCH (Birmingham), and a plastic surgeon, Mr. O. MANSFIELD (Birmingham).

Dr. H. M. COHEN (Birmingham) asked what was the right age for operating on undescended testes. Mr. WILLIAMS said that it must be done before puberty if full function of the testis was to be obtained. There was histological evidence of abnormality in undescended testes from the age of 6 years; in infancy there might be difficulty in diagnosis and danger of damage to the vas during operation, and his practice was to defer it until 8 or 9 years. Mr. GOUREVITCH preferred to say 6 to 8 years, despite Dr. Apley's opinion that in many cases descent would occur at puberty and that one might doubt whether surgery left testes undamaged. Mr. WILLIAMS thought that the ones which came down at puberty were the high retractile testes which could be difficult to distinguish from those which were undescended and which then provided almost the only indication for the use of gonadotrophins as an aid to diagnosis.

This controversial topic was changed for another when Dr. J. W. LITCHFIELD (London) inquired about the right age for operation in coarctation of the aorta. Mr. D'ABREU said that the real problem arose in the infantile cases presenting with heart failure and often accompanied by ventricular septal defects. He favoured medical treatment if possible until the age of 1 year, when surgery might be undertaken with good results. In cases without obvious symptoms he thought 7 years was a good age for operation. In replying to a question about the urgency of operation for persistent ductus arteriosus he again mentioned 7 as the age preferred by many surgeons: 7 was a magical number, a Biblical number, and it appealed to him, as he was the seventh child of a seventh child, but it really had nothing to do with persistent ductus arteriosus, which he preferred to treat at 3. He had seen no operative deaths at this age, and at 7 children were busy preparing for the 11+ examination. Where heart failure occurred, the ductus might be closed at any age, after medical preparation. Their youngest patient was 6 weeks old. Dr. Apley remarked that the ductus operations one regretted were those that had not been done.

Dr. BERYL CORNER (Bristol) and Dr. G. S. R. LITTLE (Greenwich and Deptford) asked about naevi, hairy moles, cervical sinuses, and fistulae. Mr. MANSFIELD thought that the surgeon must ask himself several questions in such cases: Were they technically operable at this age? Could a better result be obtained by deferring operation? If so, should one operate early to ease the mother's social life, remembering that except with some defects of the hand children were not conscious of their outward blemishes until the age of 6 or 7 years? The degree of blemish would affect one's decision: a hairy mole on the forehead which made a baby look like a Lakeland terrier needed earlier removal than a pale, hairless mole. With regard to facial palsy, which Dr. B. M. LAURANCE (Derby) asked about, he thought that nothing could be done during infancy anyway, and in older patients the plastic surgeon had little to offer except when facial deformity was grotesque.

Circumcision

In reply to a question about the indications for circumcision, Mr. WILLIAMS said that in childhood phimosis was the only medical indication, but phimosis was an uncommon congenital deformity which was most difficult to diagnose in the first two weeks of life, the age when circumcision was most easily performed. Mr. GOUREVITCH said that the crux was whether the meatus was rigid or not; what was called balanitis in infants was napkin rash.

Replying to the chairman, Mr. WILLIAMS agreed that circumcision gave almost complete immunity to penile cancer, but this might be because it occurred in men who either could not (because of phimosis) or would not (because of social circumstances) retract the prepuce and clean the glans. There was evidence of diminished cancer of the cervix among communities practising male circumcision, but it did not establish a causative relationship.

There was considerable discussion about the attitude of parents to circumcision—was it right to circumcise when the indications were social? Mr. Williams thought that in such cases the child was going to be circumcised by someone in any case, so it might be best to ensure that it was done properly; Dr. APLEY and Mr. MANSFIELD thought that one could often get the father on one's side in opposing operation; Mr. GOUREVITCH thought that too many general practitioners encouraged the parents to think circumcision was needed when it was not. A member of the audience asked whether it was agreed that stretching of the foreskin was the most unsuitable way of dealing with the problem, and the panel suddenly fused together in unanimous agreement.

Questioned about the use of "the pump" in the surgery of congenital heart disease, Mr. D'ABREU indicated his own group's concentration on the treatment of large ventricular septal defects with enormous blood flow through the lungs before pulmonary hypertension had set in. He stressed the much greater importance of people than of pumps—if you had £20,000 to buy a pump, it was better to spend £700 on tubing, etc., and use the rest to train four people to work it. Dr. APLEY agreed: "Too often someone has gone abroad to buy a pump and returned to find he's bought a pup."

Abdominal Pain

Mr. R. P. M. MILES (Chichester) wanted to know what should be done when, as so often happened, the surgeon saw a child, usually a girl, who had right-sided abdominal pain and whose doctor wanted the appendix removed. Mr. GOUREVITCH said he more often had to deal with cases of *central* abdominal pain; his job was to eliminate appendicitis or other organic disease, and when he had done that to say that the child would grow out of it. Dr. APLEY did not think this often happened; there was a family pattern which led to abdominal pain.

Finally the chairman asked Mr. MANSFIELD for his opinion about the age for operation on cleft lip and palate. He replied that he thought that if there was bony deformity a cleft lip should be dealt with at 3 months; if there was not it could be done at any time. A simple cleft of the palate too could be done at 3 months, and combined cleft lip and palate at 4 months if there was no deformity. The important thing was to close the nose off from the mouth—nowadays they seldom encountered deafness in patients with cleft palates.

MEDICAL RESEARCH COUNCIL

ANNUAL REPORT

The Medical Research Council's 43rd annual report,* just published, covers the Council's activities during the year ended September 30, 1957. It records that during the last financial year (1957–8) Parliament provided the Council with £2,813,000. The previous year the sum was slightly less than £2,593,000. On this the Council maintained the National Institute for Medical Research, the M.R.C. Laboratories in the Gambia, 44 research units and 21 research groups, and various external scientific staff; provided numerous research grants and training awards; and supported financially in varying degree the Institute of Cancer Research, London, the research department of the Royal Beatson Memorial Hospital, Glasgow, and the research programme of the Christie Hospital and Holt Radium Institute, Manchester. The Council also administered the Public Health Laboratory Service, and the Blood Products Laboratory (Lister Institute), on behalf of the Ministry of Health. The Council's whole-time scientific and medical staff (excluding technicians, etc.) numbered 648 and there were a further 146 employed in the P.H.L.S.

The Council

The scientific members of the Council during the year covered by the report were Professor Robert Platt, P.R.C.P., and Professor E. T. C. Spooner (until April, 1957); Sir George Pickering, Professor A. Bradford Hill, F.R.S., Professor G. F. Marrian, F.R.S., Professor R. C. Garry, Mr. H. J. Seddon, and Dr. J. D. N. Hill; and Professor C. H. Stuart Harris and Professor A. A. Miles (since April, 1957). The lay members were the Earl of Limerick, chairman; Sir Geoffrey Vickers, V.C., treasurer; and Mr. Richard Fort, M.P. The chairman of the Council's Clinical Research Board was Sir Geoffrey Jefferson, F.R.S.

The principal permanent officials are Sir Harold Himsworth, F.R.S., secretary of the Council; Sir Charles Harington, F.R.S., director of the National Institute for Medical Research; and Dr. G. S. Wilson, director of the P.H.L.S. In October, 1957, Sir Landsborough Thomson, second secretary, retired after almost 40 years with the Council, having served as deputy to each in turn of its three secretaries—Sir Walter Fletcher, Sir Edward Mellanby, and Sir Harold Himsworth. The Council records its great indebtedness, and that of medical research generally, to his rare combination of high administrative skill and scientific understanding.

New Research Units

During the year the Council set up four new units, and a fifth one just after the period. They were the unit at Leeds for research on metabolic disturbances of surgery (Professor L. N. Pyrah), groups at Exeter and the Western General Hospital, Edinburgh, respectively for research on carcinogenic substances (Dr. J. W. Cook, F.R.S.) and the general effects of radiation (Dr. W. M. Court Brown), and at Carshalton the virus culture laboratory (Dr. P. D. Cooper). The fifth unit was the microbial genetics research unit (Dr. W. Hayes) at the Postgraduate Medical School of London. In addition the Council on the advice of the Clinical Research Board took on four research projects formerly financed and administered through the Ministry of Health, and established them as Council units. They are now the clinical genetics research unit (Dr. J. A. Fraser Roberts) at the Institute of Child Health, the neuropsychiatric research unit (Dr. D. Richter) at Whitchurch Hospital, Cardiff, and the research group on juvenile rheumatism (Professor E. G. L. Bywaters) at the Canadian Memorial Hospital, Taplow.

ASPECTS OF RESEARCH

A Special Correspondent writes: Each year now the Medical Research Council's annual report contains a review of recent advances in some of those selected fields of scientific medicine in which work supported by M.R.C. funds is going on. This review increasingly attempts a popular presentation. The present report presents a summary of 15 separate fields in 50 pages. It might have been wiser to have covered fewer subjects and given each a little more space. This year, too, a great deal of space is given to matters of applied science and public health—the development of respirators, improved serological diagnosis of syphilis, poisoning by radioactive strontium, for instance—and by contrast rather too little to the fundamental science on which in the end all progress is based. Perhaps this shift of balance away from the laboratory sciences towards more practical and clinical problems reflects the greatly increased awareness of the value of applied science and technology in all fields of Government and administration to-day.

Respirators

Poliomyelitis and Asian influenza, and the recognition of certain other respiratory and gastro-intestinal viruses, account for a quarter of the whole review. The most interesting section of this is the account of how the "iron lung" and other respirators have been developed by organized exploitation of physiological and engineering knowledge. Poliomyelitis was the spur to the invention of these breathing-machines, the first by Drinker in the U.S.A. in 1929. This was a negative pressure machine, and experience with it suggested it might have been responsible for some deaths and for a certain amount of permanent crippling. So the M.R.C. set up a committee in 1938 to consider the whole problem, the different kinds of machines possible, and the physiological factors at work. Informa-

**Report of the Medical Research Council for the Year 1956–1957*, 1958. H.M.S.O., London.

tion was needed on the relation between the machine's working and the patient's tidal air, vital capacity, and tendency to acidosis or alkalosis. About the same time, Lord Nuffield generously presented nearly 1,000 machines to hospitals throughout the Commonwealth. These were a modified Drinker machine, devised by Both of Australia. Then came the war of 1939–45, and interest lapsed.

Interest revived with the big poliomyelitis epidemic of 1947 in Britain. The crisis showed up the inadequacies of the situation. Many of the respirators had not been well maintained over the years, and spare parts were difficult to come by. Power failures showed that hand-pumping was ineffective, and the rubber bellows sometimes ruptured after several weeks' continuous use. The Ministry of Health called on the M.R.C. to come to the rescue.

The first step was the physiological assessment of the problem, to define the precise aid the patient needed at different stages of his illness, and the use of the spirometer as part of routine clinical study of cases. The second was consideration of two practical problems: how to keep the airway clear, and how to keep the machine working reliably. This led to a special report in 1950, and the drafting of a standard performance specification for cabinet respirators for the manufacture of these machines. A special kit was invented so that hospitals could modernize their Both respirators. New patterns of cabinet machine facilitated nursing attention, while portable cuirass respirators (see Fig.) meant that patients could be weaned from dependence on cabinet and nurses, lead an independent life, and go home. Special instruments needed for proper treatment were also invented, such as the electronic stethoscope for examining the patient inside the working cabinet. These successful developments were the work of many people — motor engineers, industrial firms who voluntarily collaborated, the R.A.F., and so on, as well as medical workers —reminiscent of the way some of the big problems of the war such as radar and the atom bomb were solved through the collaboration of many skills.

Spirashell cuirass respirator. Reproduced by courtesy of the Medical Supply Association, London.

Viruses and Interferon

Another aspect of the poliomyelitis problem, culture of the causative virus in cells in tissue culture, has led to the discovery of a number of new viruses, particularly the adenovirus group responsible for various infections such as "febrile catarrh" and some atypical pneumonias, through study of tissue cultures made from infected tonsils and adenoids. Complement-fixing antigens from these viruses appear in the fluid of such cultures and this has opened the way to the study of antibody titres in the sera of normal people and those suffering acute infections. By the tissue-culture method a number of viruses have also been isolated from intestinal contents and human faeces—poliomyelitis and Coxsackie viruses, but also some known as ECHO (enteric, cytopathogenic, human, orphan) in which the word "orphan" implied that they were not known to cause human disease. However, one has since been implicated in benign aseptic meningitis, and it seems likely that some viruses which are normal inhabitants of the gastro-intestinal tract may on occasion produce disease epidemics.

In the field of pure science the discovery of interferon is one of the most interesting advances in virology for some time. It is well known that one virus growing in tissue culture cells prevents another unrelated virus from infecting the cells at the same time, and M.R.C. workers have discovered that this interference is brought about through a chemical substance, a product of the activity of the first virus and its cell host. This substance is now being purified, and it is thought to act by interfering with nucleic acid metabolism. So its discovery may shed new light on the biochemistry of normal and cancer cells.

A field where virology and cancer research meet is the study of leukaemia. It seems that the natural disease in mice is probably due to a virus, and the question was asked whether radiation-induced leukaemia in mice is also infective. This appeared not to be so. The precise dose and time relations for inducing leukaemia have been investigated, and it is interesting to find that something from the thymus predisposes an individual animal to get leukaemia. The thymectomized mouse is protected from this form of physical breakdown. Here then is another strange chemical substance controlling the fate of cells.

Mechanism of Fever; Arthritis

A third substance with an important physiological effect emerges from recent studies of the mechanism of fever. That bacteria which cause fever contain extractable fever-producing substances (lipopolysaccharide, usually) is an old observation. What is new is that these substances probably do not act directly on the temperature-regulating centres of the brain but act instead on the white blood corpuscles, which thereupon liberate a new hitherto unidentified substance which is the true brain agent. This agent does not paralyse temperature control but holds the thermostat at a new level.

The last few years have seen important advances in the diagnosis of rheumatoid arthritis. The Rose serological agglutination test is a positive way of distinguishing this disorder from other confusingly alike conditions. Also *x*-ray pictures can be used to differentiate a common form of generalized osteoarthritis from true rheumatoid arthritis. Though clinically similar, osteophytes at joint margins, and bony sclerosis, are seen in the former condition, erosion of joint surfaces and osteoporosis in the latter. Using these tests various populations have been surveyed and some interesting results have emerged. For both Wales and Lancashire true rheumatoid arthritis has been found equally common in both men and women. Clinically, and almost traditionally, women were supposed to be the major sufferers—but the excess of polyarthritis in middle-aged women is now found to be osteoarthritis and not the rheumatic condition. Also it seems that in men rheumatoid arthritis may in some way predispose to both pulmonary tuberculosis and pulmonary nodular fibrosis.

X-ray Crystallography

Finally, some progress in pure science—the structure of protein molecules. All crystals scatter *x* rays, and from a photograph of the scatter spots something can be deduced about the shape of molecules which form the crystal. Each atom in the molecule is responsible for a bit of the scatter. It was study of suitable crystals in this way which helped to settle the formula of penicillin, for instance. Crystalline proteins and viruses can also be studied by *x* rays, but since they contain a very large number of atoms and these are rather small the resultant scatter photograph is poor and difficult to interpret. The situation has been improved by introducing "marker" atoms, such as mercury, into the crystals. They combine at certain special points (where there is sulphur in the amino-acid cysteine, for example),

and the scatter to which they individually give rise can be picked out. Applying this method to a rather simple protein, myoglobin, the haemoglobin inside the fibres of red muscles, it has been possible to deduce its molecular shape and to make a model of it.

MEDICAL WOMEN'S INTERNATIONAL ASSOCIATION

EIGHTH CONGRESS IN LONDON

On July 16 the COUNTESS MOUNTBATTEN OF BURMA opened the Eighth Congress of the Medical Women's International Association. The Congress was held from July 15 to 21 at Bedford College, London, under the presidency of Dr. M. YOLANDA TOSONI-DALAI, of Milan. The British Medical Women's Federation, under its president Dr. KATHARINE LLOYD-WILLIAMS, acted as the host organization. The theme of the Congress was "The Adolescent," and during the scientific sessions the physical, endocrinological, psychiatric, and social aspects of that period of life were considered.

The Medical Women's International Association was founded in 1919 in New York at a meeting at which Dr. ESTHER POHL LOVEJOY, who attended the present Congress, was elected as the association's first president. It has the distinction of being the oldest international medical association in the world.

Lady Mountbatten's Address

LADY MOUNTBATTEN said that she came to the Congress as one who for many years had taken the greatest interest in health and welfare. For a long time she had been fortunate to work closely with the medical and nursing professions in Britain and in many other parts of the world, and that close association had been an inspiration to her. Their work was often hard and testing. But it derived its inspiration from women with the highest of qualifications who desired to render a service, the finest of all services, regardless of any restrictions which a question of politics, economy, race, or religion might seek to impose. All of them as doctors were united in the unceasing fight against disease and human suffering; they were united in that fellowship which transcends the barriers of nationality, caste, or creed.

As superintendent in chief of the St. John Ambulance Brigade and president of the Save the Children Fund she had worked with people of all nationalities, with widely differing problems and points of view. That had brought home to her very vividly the vital necessity for the fullest possible understanding between nations; and in the achievement of that understanding she was certain that the medical profession, because of its great humanitarian tradition and motive, had a unique mission to fulfil. For that caring for the sick and suffering, that deep concern for the welfare of the human being anywhere and everywhere which animated the work of the medical profession throughout the world, made it, more than any other human activity, a powerful factor for international understanding, co-operation, and toleration.

It was most inspiring to know that the Medical Women's International Association insisted that the constitution of affiliated societies must include a clause admitting to membership all duly qualified medical women, irrespective of race, religion, or political belief. "I find in the present gathering together of women doctors a most heartening example of professional co-operation at an international level. And I can think of no other group of women in a position to make such a vital contribution to the welfare of the whole world, not only as doctors but as ambassadors for peace and friendship, justice and understanding."

Special Contribution of Women Doctors

The work of women pioneers in the medical field had always had a special interest and indeed fascination. For it was only through their courage and devotion that women doctors had to-day achieved such recognition and in most parts of the world had so consistently held a position of recognized professional equality with their colleagues. Since those early days experience had abundantly proved that women doctors had made a very special contribution to medicine and medical studies in that, being women as well as doctors, they had helped to focus attention on certain topics of special interest to women, notably gynaecological disorders, the health of mothers and children, and paediatrics generally.

That a more enlightened attitude to problems particularly affecting women was gaining ground was due in no small part to the influence and the devoted and outstanding work of women doctors in this country and abroad, and of the various national associations of medical women which were brought together in this international association. One had only to look at some of the subjects which had been discussed at past congresses—"The Problems of the Married Woman Working Outside the Home," "The Pathology and Hygiene of Housework," "Anaemia in Women," among others—to realize how much attention had been given to the special problems of women. These and the theme for the 1960 Congress, which was "The Old Woman," could only really be thoroughly and authoritatively discussed by a gathering of this kind.

This year the theme would be "The Adolescent." "I am quite certain," went on Lady Mountbatten, "that your scientific, unbiased, and womanly approach to the subject will make an extremely important contribution to a better understanding of the problems involved, and will help to clear away a lot of the muddled thinking which has obscured the whole subject."

Pioneers in India

In her travels she had had a wonderful opportunity of seeing and assessing the contribution made by women doctors in the medical field, especially in India, which she knew so well and for which she had the deepest affection. One always remembered the women pioneers who went to India in the 'seventies and 'eighties and who overcame almost insurmountable obstacles in order to lay the foundation of the Zenana hospitals, teaching institutes for midwives, and medical schools for women. She had visited those hospitals, institutes, and schools and no praise could be too high for those who were responsible for starting them.

In India she had heard on every side the names of Dame Mary Scharlieb, Dr. Margaret Balfour, and Dr. Ruth Young spoken of with the deepest gratitude. Also Dr. Clara Swain, of the Women's Foreign Missionary Society of the Methodist Episcopal Church, who was the first qualified medical woman to land in India. She came from New York in 1870 and started the first women's college in India. The courage and devotion of these women amongst others to whom India owed the medical relief given to-day to her women and children were something which could never be forgotten.

While speaking of India, it would be impossible not to make a special mention of one of the world's great international medical centres, founded at Vellore by Dr. Ida Scudder in 1902. To-day Indian women themselves were playing a vital part in the medical field and also in the organization of voluntary bodies such as the Red Cross Society and the extension of the St. John Ambulance Brigade.

All over the world medical women, because of their splendid achievements, had a higher reputation in their profession than any other professional women. And in all this they had had the tireless support of their national associations and of the Medical Women's International Association to which these were affiliated. Their association was fully equipped not only to promote the interests of medical women but to make a wonderful contribution to the welfare of other women too.

Lady Mountbatten then declared the Congress open.

To-day's Drugs

In this column we publish from time to time authoritative notes on a selection of drugs in current use.

Trypure Novo Stabilized (Evans Medical Supplies Ltd.).—Pure crystalline trypsin stabilized with a calcium salt in vials of 50 mg. or 1 g. and as a dispersible powder in an inert base.

The idea of using substances which would bring about the dissolution of necrosed tissues and of blood and lymph clot in order to facilitate drainage and debridement is by no means new. Over thirty years ago Dakin's solution was thus employed, especially in thoracic surgery, but its effect remained doubtful. In 1933 Tillett and Garner (*J. exp. Med.*, **58**, 485) showed that the filtrate of a broth culture of certain haemolytic streptococci had the power of lysing the viscous elements of pus and fibrin clots, and they isolated two enzymes—streptokinase and streptodornase—which have since been used in a wide range of conditions. The earlier name of these enzymes, fibrinolysin, should not be confused with "fibrolysin" (thiosinamine sodium salicylate), which has been used to soften fibrous tissues and scars.

Trypure is another enzyme which can be used in the debridement of necrotic tissue and the liquefaction of purulent viscid accumulations and clots. The powder, which should not be taken internally, can be applied as such, but as it is readily soluble in water the enzyme can also be administered by local instillation or injection, or inhaled as an atomized solution. The dry powder is stable at room temperature for long periods; the solution remains active at this temperature for about 48 hours, but at 5° C. (41° F.) it can be stored for 2–3 months. Like many other enzymes it is quickly destroyed by heat above 55° C. (131° F.). It is particularly applicable in thoracic surgery—haemothorax, empyema, exudative pleurisy, lung abscess—but other closed-space suppurations such as sinusitis and subphrenic and liver abscesses can also be so treated. Among the many surface conditions which are suitable are infected necrotic wounds and burns, gangrene, and ulcers, and it may be used in the preparation of infected surfaces for skin grafting.

N.H.S. basic price: dual pack of 50 mg. stabilized trypure and 15 ml. sterile saline, 13s. 3d.; 2 g. of 2.5% trypure powder, 13s. 3d.

Irgapyrin (Geigy Pharmaceutical Co.).—Put up in ampoules of 5 ml. containing 30% solution for intramuscular injection, and as tablets of 250 mg., this substance contains equal quantities of amidopyrine and phenylbutazone. When first introduced in the treatment of the rheumatic disorders amidopyrine was considered the more important constituent, but because of its reputation as a cause of agranulocytosis phenylbutazone was later used alone and proved effective. Both constituents may, though rarely, cause agranulocytosis; phenylbutazone may cause gastro-intestinal disturbances, including peptic ulceration and bleeding, nausea, oedema, and drug rashes. One tablet twice or thrice daily, or one injection every 1–4 days, relieves pain in many conditions, including osteoarthritis, ankylosing spondylitis, rheumatoid arthritis, osteitis deformans, and metastatic malignant disease. It should be used with extreme caution if at all in patients with co-existing peptic ulceration, congestive cardiac failure, or conditions of renal or hepatic insufficiency.

N.H.S. basic price: 5 ampoules, 8s. 5d.; 50 tabs., 18s.

A *Supplement on Cancer* has been issued by the Registrar-General for England and Wales for the year 1953 (H.M.S.O., 7s. 6d.). It gives statistics derived from about 35,000 cases for cancer of the uterus, ovary, testis, penis, lip, tongue, mouth, pharynx, and oesophagus. Records for previous years are in some cases given for comparison.

Correspondence

Because of heavy pressure on our space, correspondents are asked to keep their letters short.

Russian Vaccine for Multiple Sclerosis

SIR,—During the past few days we have had an opportunity of discussing the multiple sclerosis vaccine ("vaccine of Shubladze and Margulis") and the S.V. strain of acute encephalomyelitis virus of man from which this vaccine is prepared. We think it is clearly necessary to reinvestigate and characterize the original isolates of this virus, for recent experiments have shown that the S.V. strain in current use is similar to rabies virus.

As far as treatment with the "vaccine of Shubladze and Margulis" is concerned, it is not possible to make any further recommendation until reinvestigations have been made.—We are, etc.,

Moscow.

A. K. SHUBLADZE,
Chief of Laboratory, Ivanovsky Institute of Virology, Moscow, U.S.S.R.

G. W. A. DICK,
Professor of Microbiology, The Queen's University, Belfast, Northern Ireland.

Imbecile Children

SIR,—I hope that your readers will not be misled by Dr. J. Burkinshaw's letter (*Journal*, June 28, p. 1543) into thinking that the Fountain Hospital alone provides temporary admission for imbecile children. In 1956, 2,020 such children were admitted for temporary periods to 99 mental deficiency hospitals in this country. Only 602 were found alternative placement, and the local health authorities, in my opinion, could assist greatly in keeping children out of hospital by providing short-stay homes themselves.

I do not agree entirely with Dr. Burkinshaw's suggestions for their eventual admission. In actual fact many ineducable children do better in a hospital with a properly equipped and staffed school than they do at home, where no, or an inadequate, occupation centre is available. Our problem is not only to admit, but to discharge, children who could well live at home. Their parents, however, are delighted with their progress, take them home each weekend, but refuse, quite rightly, to take them out of hospital entirely because the community, so far, provides no comparable training. A five-day residential school centrally situated to deal with urban or county areas could obviate this.

If we are to introduce ineducable children gently to our hospitals and admit them as soon as they are too big to be the "family pet" they will be with us, in this antibiotic era, for the next fifty years at least. How are we to provide beds for that? I should rather catch them young, if they *have* to come to hospital, and try to train them for sheltered work, either going daily from their home circle or living in hostels. We could then give the holidays in hospital at that stage if required to do so.—I am, etc.,

Botleys Park Hospital, Chertsey.

J. M. CRAWFORD.

Cardiac Arrest

SIR,—Dr. D. W. Blair and his colleagues (*Journal*, June 28, p. 1521) report a case of recovery from neurological sequelae after cardiac arrest. They are to be congratulated on their prompt diagnosis and the early institution of cardiac massage, which resulted in a return to a good general condition in their patient. In spite of this the patient obviously suffered severe cerebral damage and, even with cooling to reduce the metabolism of the damaged nerve cells, consciousness was not regained until the third post-operative day, and final recovery was not achieved for two months.

The knowledge that cardiac arrest, especially in the operating theatre, need not inevitably be fatal has resulted in

cardiac massage being instituted much more frequently than formerly; consequently cases of residual cerebral hypoxic damage may be encountered in increasing numbers. Some of the cerebral damage in these cases may be irreversible, but probably a larger proportion of cells are reversibly damaged. It does not seem to be sufficiently realized that in addition to nerve cell injury there is cerebral vascular damage due to the acute hypoxic episode, and increased permeability from damaged capillaries leads to subsequent cerebral oedema. This oedema fluid acts as a physical barrier and cell respiration is impaired; in addition C.S.F. pressure is probably raised and venous obstruction encouraged, all of which mitigate against cellular recovery and reversibly damaged cells now succumb.

Sadove, Wyant, and Gittelson[1] recommended that cases of cardiac arrest should be treated by a dehydration regimen to combat this cerebral oedema. We have reported some cases of severe cerebral hypoxia in which dehydration with I.V. 50% sucrose was instituted[2] and were favourably impressed with the results; other cases since then have confirmed our views. Experimental work on dogs on which we are now engaged at the Clinical Research Institute of the Middlesex Hospital also encourages us as to its efficacy.

Cerebral hypoxia with residual neurological lesions can follow hypoxic episodes from many causes less severe than cardiac arrest, and we believe that, if dehydration therapy were instituted, recovery would be more frequent and certainly more rapid.—We are, etc.,

Portsmouth. D. E. ARGENT.
London, W.1. D. H. P. COPE.

REFERENCES

1 Sadove, M. S., Wyant, G. M., and Gittelson, L. A., *Brit. med. J.*, 1953, 2, 255.
2 Argent, D. E., and Cope, D. H. P., ibid., 1956, 1, 593.

Neurological Complications of Pertussis Immunization

SIR,—Dr. J. M. Berg's timely review of the neurological complications of pertussis immunization (*Journal*, July 5, p. 24) has prompted us to record our own experience of similar cases. In the past 10 years one of us (D. C. T.-P.) has seen six patients with neurological reactions developing within 24 hours of pertussis immunization. One of these cases was fatal and three were left with permanent brain damage.

Case 1.—A male infant, whose development had been normal in every way, was quite well until he had convulsions nine hours after his third inoculation with combined diphtheria and whooping-cough vaccine. During the attack he was unconscious for 10 hours with right-sided convulsions, which were followed by a temporary right-sided hemiplegia. He continued to have major fits of a similar nature periodically and also attacks of petit mal. His behaviour was later characterized by marked restlessness and overactivity, and he showed all the signs of the "hyperkinetic syndrome," described by Ounsted.[1] His mental development, which appeared to be well advanced up to his immunization at 9 months, became retarded.

Case 2.—A male child, who had been quite healthy since birth, received his first dose of pertussis vaccine at the age of 8 months, at the same time as his twin brother. Seven hours later he developed convulsions, which continued intermittently until he was admitted to hospital, comatose, in status epilepticus. He died soon after admission, 14 hours after being immunized. Necropsy was performed nine hours after death. The only relevant findings were cerebral oedema and intense congestion. Microscopic examination failed to show any evidence of haemorrhage, encephalitis, or degeneration of neurons, as described by Globus and Kohn.[2] The other twin remained unaffected, and there was no family history of epilepsy. A report of the coroner's inquest in this case appeared in the medico-legal column of this *Journal*.[3]

Case 3.—A male infant, who had had two convulsions at the age of 6 months, made normal progress until his second combined diphtheria and whooping-cough inoculation at the age of 13 months. About 12 hours after the injection he developed status epilepticus, followed by a left hemiplegia; the paresis gradually improved, leaving a residual weakness of the left hand. He continued to suffer from periodic major and minor fits and his mental development became retarded. His behaviour pattern was also hyperkinetic, and at intervals he was intensely restless, overactive, and destructive. The similarity of behaviour to that in our first patient was most striking. When last seen, at the age of 4, his gait was still ataxic.

Case 4.—A male infant aged 5 months developed convulsions and prolonged unconsciousness seven hours after his first inoculation with combined diphtheria and whooping-cough vaccine. He had a past history of one convulsion, lasting 10 minutes, five weeks previously. Until he was immunized his progress had been, if anything, in advance of normal, for he sat up at the age of 4½ months. He continued to have fits periodically. When he was learning to walk at the age of 1, he was found to be very ataxic, and two years later he was still unable to walk alone. His behaviour was restless and hyperkinetic, though this was not so marked and troublesome as in Cases 1 and 3.

Case 5.—A male child aged 6 months had been well until his second injection of combined diphtheria and whooping-cough vaccine. Following the inoculation he slept for three and a half hours and then woke with a persistent unnatural cry. He vomited once, but there were no convulsions. During the next two weeks he remained miserable, listless, and made no attempt to sit up as before. His condition was described by his parents as "completely lifeless." He then recovered, apart from some loss of weight and appetite during the next fortnight. He appeared quite normal when he was last seen four months later.

Case 6.—A normal healthy male infant aged 6 months some hours after receiving his first dose of combined diphtheria and whooping-cough vaccine, was noticed by his mother to be abnormally limp and drowsy. He lay in a stuporose condition for about 12 hours, frequently emitting shrill whining cries. There was no pyrexia or evidence of infection. The child then made a gradual complete recovery. This was a relatively mild reaction, which is quite possibly not uncommon. It is included as it may be an example of the type of case which would sustain severe brain damage if further doses of pertussis vaccine had been given.

The fact that six cases of neurological complications following the administration of pertussis vaccine have occurred in our limited experience suggests that the danger of whooping-cough immunization are greater than Dr. Berg and others seem to think. Although whooping-cough with all its attendant complications constitutes a serious risk in young children, the disease seldom produces permanent brain damage. It is therefore very doubtful whether the natural disease does in fact afford a greater danger of neurological sequelae than prophylactic immunization.

The significance of recent pertussis immunization was overlooked in two of our patients when they were first admitted with convulsions. It is possible, therefore, that on many occasions encephalopathy following pertussis immunization is not diagnosed, especially in the milder cases. The hyperkinetic syndrome is usually associated with epilepsy and brain damage arising from an organic cerebral insult in early life. Encephalopathy due to pertussis immunization, so far as we are aware, has not been previously reported as a cause of this syndrome. It would be interesting to learn whether others have encountered similar cases.

We agree with Dr. Berg that pertussis immunization is contraindicated in all children with a history of convulsions and also in those who have had minor reactions to the initial dose of the vaccine.—We are, etc.,

Stoke-on-Trent. D. C. THURSBY-PELHAM.
C. GILES.

REFERENCES

1 Ounsted, C., *Lancet*, 1955, 2, 303.
2 Globus, J. H., and Kohn, J. L., *J. Amer. med. Ass.*, 1949, 141, 507.
3 *Brit. med. J.*, 1949, 2, 1478.

Medical War Crimes

SIR,—Several of your correspondents have expressed their dismay at the fact that Dr. Herta Oberheuser, convicted of medical war crimes, has been permited to resume practice in Germany. It is good to know that the British Medical Association have now formally protested against this cynical decision. It is also good to know that the West German Medical Association and the Ministry of the Interior of Schleswig-Holstein have instituted proceedings for the withdrawal of her approbation to practise.

Unfortunately this particular case is not an isolated instance. As Dr. E. T. Wright points out in his letter (*Journal*, July 5, p. 51), others besides Dr. Herta Oberheuser are now free and have had their rights to practise restored. Thus Dr. Hans Eisele, who was sentenced to death for his atrocities at Buchenwald only to be released from prison after 7 years, is once again prominent in a press report from which it appears that he, too, was allowed to practise. It will be remembered that when the World Medical Association was established at the end of the war German medicine was barred until it had accepted the Declaration of Geneva setting out the ethical obligations of medicine and subsequently had publicly expressed regret at the failure of the German medical profession to protest against the cruelties and inhuman experiments on living subjects carried out by German doctors during the Nazi regime.[1] This public declaration also undertook to bar all members who were personally guilty of the crimes referred to.

It would be gratifying to know through the World Medical Association that German medicine is mindful of its honour and its obligations in this matter and that it does not need to be prompted into action by protests from abroad.—I am, etc.,

London, N.20. ARNOLD SORSBY.

REFERENCE

[1] See *Wld med. Ass. Bull.*, 1949, **1**, 4.

SIR,—I have followed the correspondence on medical war crimes with great interest, but also with a profound feeling of untold sadness. Many thanks are due to Dr. M. H. Armstrong Davison (*Journal*, May 10, p. 1121), who drew attention to this unsavoury situation, and to Dr. E. Townsend (*Journal*, May 24, p. 1237), Dr. Wilhelmina C. Maguire (*Journal*, June 14, p. 1420), and Dr. E. T. Wright (*Journal*, July 5, p. 51).

What happened in those terrible camps, the crimes committed by medical men and women, are without parallel in the annals of human martyrdom. When these infamous creatures were arraigned before the tribunal, they were not accused of some petty local crime but of capital crimes against humanity. But how has humanity forgotten? Hardly a voice when Herta Oberheuser and Hans Eisele (he took part in the experiments of notorious Buchenwald) return as practising doctors. With Europe's integration, also in the medical field, it cannot be a matter of indifference that medical ethics, honour, and dignity can so be flouted. One would have expected the medical societies and associations, religious, political, and humanitarian, and the Colleges to dissociate themselves vigorously from those who allowed these medical killers back into the brotherhood which has promised to preserve life at all costs. And, indeed, would this shocking occasion not provide the opportune moment for the World Medical Association to propagate afresh the revised version of the Hippocratic Oath, adopted in September, 1948, a paragraph of which reads: "I will not permit consideration of religion, nationality, race, party politics or social standing to intervene between my duty and my patient; I will maintain the utmost respect for human life, from the time of conception; even under threat, I will not use my knowledge contrary to the laws of humanity."[1]

Since Dr. A. P. Tait's letter (*Journal*, July 5, p. 51) expresses some spark of sympathy with Oberheuser, may I remind him what this creature perpetrated? She took part in some of the most gruesome experiments on helpless women prisoners. She admitted herself that she killed such helpless patients by gasoline (petrol) injections. "I myself administered 5 or 6 such injections" (Doc. No. 487).[2] One of her colleagues, Dr. Rosenthal, stated: "I saw several times that Dr. Oberheuser gave prisoners gasoline injections. She used a 10 c.c. syringe and made the injection into the arm vein. The effect offered the picture of acute heart failure. The patients would rear up and suddenly collapse. The time from the injection until death was between three to five minutes. The patients were fully conscious down to the last moment."[2]

I am confident that Dr. Tait would not tolerate such a doctor restored by the General Medical Council to the *Register* if convicted of such barbarous, pseudo-medical, murderous assaults on helpless innocent people.

Mr. A. Dickson Wright, on a memorable occasion, spoke most movingly about these crimes, and asked: ". . . Could a profession such as ours play its share without a word of protest?"[3] Indeed, can it?—I am, etc.,

London, N.W.10. FELIX S. BESSER.

REFERENCES

[1] *Wld med. Ass. Bull.*, 1949, **1**, 13.
[2] Mitscherlich, A., and Mielke, Fred. *Doctors of Infamy*, 1949. Henry Schuman, New York, p. 63.
[3] Dickson Wright, A., Presidential Address, Medical Society, 1955, *Trans. med. Soc.*, 1956, **72**, 10.

SIR,—Dr. A. P. Tait's letter (*Journal*, July 5, p. 51) is beyond my comprehension. What does it matter whether Dr. Herta Oberheuser does or does not perform her job properly? Nothing she does can expiate the terrible crimes against humanity she has committed. Of course one would not expect her to continue her hobby of mutilating her patients under present circumstances.

It is bad enough that this monster is at liberty at all, but the thought that she is once more one's "colleague" is downright revolting, and it is revealing, though not unexpected, that the German authorities have given her their blessing. The misdeeds for which practitioners are struck off the *Register* in this country are like parlour games compared with Dr. Oberheuser's activities, and indeed Dr. Tait talks of her "past behaviour" as if she had been guilty of being "drunk in charge" or some similar misdemeanour. I presume that, fortunately, no member of Dr. Tait's family has been experimented on by Dr. Oberheuser, as otherwise he would soon have come down from his lofty perch.—I am, etc.,

London, W.12. A. MEYER.

SIR,—In his letter (*Journal*, July 5, p. 51) Dr. A. P. Tait is hardly realistic if he considers that Herta Oberheuser and her colleagues should be permitted to practise medicine again if, after serving prison sentence, they have become "dedicated practitioners." He does not appear to realize how heinous have been their crimes.

Should not Dr. Tait give some thought to the patients, even though some of the war-crimes doctors may have undergone a complete conversion? Might it not be very distressing for a patient, whether a German or a refugee, who had suffered in a concentration camp, to discover that the doctor on whose list he finds himself had such a sinister and frightening medical record? To inspire and secure full confidence between patient and doctor—so essential for effective medicine—the latter must be ethically beyond reproach.—I am, etc.,

London, E.C.1. WILHELMINA C. MAGUIRE.

SIR,—May I make a plea to members of the B.M.A. to use their great influence to obtain justice and adequate compensation to the deeply wronged victims, most of whom are refugees? The German Federal Government, in a letter to the U.N. Secretary-General, dated July 30, 1951,[1] undertook to give them "fair compensation regardless of their nationality or present country of residence," yet its latest communication[2] shows that among the 707 claims not yet considered are 69 from Poland and 407 from Yugoslavia, held up, Germany states, owing to diplomatic difficulties. Could not the World Health Organization offer the services of impartial investigators?

The U.N. Secretary-General sought to discover[3] the "condition of the surviving victims," but this he failed to do, and the matter has been apparently dropped and forgotten. Nothing definite is known. Germany cannot know the condition of the uninvestigated claimants and reveals nothing regarding the condition of those whose cases have been adjudicated—perhaps because it would show how insufficient

was the help given. This the latest German statement[2] shows to be an average payment of 5.860 DM. (£500) to those granted any compensation. (This sum, curiously enough, is almost exactly that granted automatically, together with other benefits, as "compensation" to most released war criminals—including Drs. Oberheuser and Hans Eisele.[4]) Moreover, Germany has categorically refused to pay these victims a pension, although the International Refugee Organization stated that "the experiments left the victims with permanently impaired health."[5]—I am, etc.,

FRANCES BLACKETT,
Honorary Secretary,
British League for European Freedom.

London, S.W.1.

REFERENCES

1 United Nations Economic and Social Council. 2nd Progress Report by the Secretary-General, 1951, p. 31.
2 Ibid., 5th Progress Report, 1958, p. 5.
3 Ibid., 1st Progress Report, 1951, p. 4.
4 See *Manchester Guardian*, July 10, 1958, p. 1.
5 United Nations Economic and Social Council, 1st Progress Report, 1951, p. 29.

Rh Blood Groups and Sex Ratio at Birth

SIR,—In a series of babies born in Aberdeen Maternity Hospital, and blood-grouped as part of a research programme supported by a grant from the Scottish Hospital Endowments Research Trust, the ratio of male to female Rh(D)-positive babies is significantly higher than that of the Rh(D)-negative babies. The sex ratio of the Rh-positive babies (Table I) is 1.12 (1,964:1,754), while that of the Rh-negative babies is 0.93 (440:473), the probability of obtaining such a difference by chance being 1.3%.[1]

TABLE I.—*Sex-ratio of White (Aberdeen) Newborn Babies*

Rh(D)-positive Babies				Rh(D)-negative Babies			
Group	Male	Female	M. F.	Group	Male	Female	M. F.
AB	52	51	1·02	AB	19	14	1·36
B	222	192	1·16	B	53	49	1·08
O	1,023	906	1·13	O	229	230	1·00
A	667	605	1·10	A	139	180	0·77
Aggregate	1,964	1,754	1·12	Aggregate	440	473	0·93

TABLE II.—*Sex-ratio of White (Aberdeen) Newborn Babies*

Babies ex Mothers	Number of Babies				
	Male	Female	Male	Female	M. F.
O Positive ex O Positive ..	579	520	677	609	1·11
O Positive ex O Negative ..	98	89			
A Positive ex A Positive ..	322	299	365	350	1·04
A Positive ex A Negative ..	43	51			
O Negative ex O Positive ..	93	93	148	155	0·95
O Negative ex O Negative	55	62			
A Negative ex A Positive ..	40	59	73	113	0·65
A Negative ex A Negative	33	54			

In view of Sanghvi's[2] finding of a significantly higher sex-ratio for O babies of O mothers than for A babies of A mothers it is interesting that in the Aberdeen series so far the O Rh-negative babies of O mothers have a *lower* sex-ratio than the A Rh-positive babies of A mothers (Table II). Thus, despite the high sex-ratio, so far, of the Rh-negative AB's the balance of evidence to date suggests that the Rh sex-ratio difference shown above would, if confirmed, prove independent of any ABO sex-ratio differences.[1] A detailed account of these findings, with acknowledgments, will appear elsewhere.—I am, etc.,

T. M. ALLAN.

Aberdeen.

REFERENCES

1 Brass, W., personal communication, 1958.
2 Sanghvi, L. D., *Nature (Lond.)*, 1951, **168**, 1077.

Suffocation in Infancy

SIR,—With reference to Dr. J. Shackleton Bailey's letter (*Journal*, July 12, p. 104), when I was coroner of Birmingham I carried out an investigation as he has suggested into sudden and unexpected deaths of infants reported to me and extending over the seven years 1938–44, and the findings were published in an article in the *Journal*[1] relating to 318 deaths so reported in which asphyxia was considered a possible cause by a general practitioner. Of these, 38 were shown to be so caused; 18 of them resulted from mechanical suffocation while in bed with some other person, and 6 from mechanical suffocation while sleeping alone. The remaining 280 deaths were definitely ascribed to natural causes, and these causes with the age of the infant were set out in detail in the report, supported in every instance by the post-mortem findings of a *skilled* pathologist.

In all such cases a necropsy is absolutely necessary in order to avoid mistaken diagnosis and to avoid the distress of a mother that she may have been responsible for her infant's death. The Coroners Amendment Act, 1926, gives coroners power to order a post-mortem examination, with or without the necessity of an inquest, and in my opinion no medical man is justified in hazarding a cause of death in such circumstances without a necropsy.—I am, etc.,

W. H. DAVISON.

Birmingham.

REFERENCE

1 Davison, W. H., *Brit. med. J.*, 1945, **2**, 251.

Pilot Ampoules

SIR,—Sensitivity towards horse serum is found in an increasing number of patients, so that it is necessary to test their sensitivity before curative or even prophylactic doses of sera like anti-diphtheria and anti-tetanus sera, etc., are administered. At present, to conduct this test a little of the serum from the big ampoule is taken and diluted. This process of dilution, apart from being cumbersome, leaves the opened ampoule liable to bacterial contamination if left unprotected; and if the patient is found to be sensitive the ampoule may have to be thrown away and thus wasted. Hence it would be very convenient and advantageous if the manufacturers of these sera would provide diluted serum in 0.5 or 1 ml. ampoules. These could either be sold separately or, better still, be packed as pilot ampoules with the usual serum ampoules.—I am, etc.,

V. R. BHAT.

Mangalore, South India.

Lung Cancer and Tuberculosis

SIR,—My attention has been called to a letter by Dr. T. G. Paxon (*Journal*, April 12, p. 887) containing the sentence, "It has been maintained before and also hotly contested [reference] that tuberculosis has some relation to cancer." The reference is to an article of mine[1] and reflects a misunderstanding. So far from having contested in that article that there may be a relation between these two diseases, I quoted from Pearl,[2] and commented favourably with regard to its consideration as follows:

"Another quotation from Pearl (1929) is pertinent to the subject under present discussion: '. . . it is of interest to note that as the frequency of incidence of fatal tuberculosis of the lungs has declined in recent years there has occurred a marked increase in lung cancer, which has been so notable as to attract the attention of pathologists generally.'

"In considering the significance of the putatively real increase of the rate at which lung cancer is developing in the population . . . individuals reaching the adult cancer ages in current times are, in respect to their constitutional resistance to disease, greatly different from indjviduals formerly attaining these ages. The marked lowering of death rates in the early ages of life that characterizes the hygiene of the present era has resulted in having in the adult population individuals who in former years would have died in infancy or youth. It is likely that they carry with them a measure of the lower resistance to disease which was the constitutional basis of their former early death."

That statement was made apropos of the subject of smoking and lung cancer. In much of the literature on smoking and lung cancer the impression is easily gained that the increase in reported mortality from lung cancer is a very recent observation, and that smoking is virtually the only explanation that has been advanced for it. The quoted remark of Pearl reflects that an increased incidence of lung cancer was the subject of general comment even before 1929. As to the novelty and uniqueness of the cigarette-smoking theory, it is, in point of fact, Johnny-come-lately. From the time when a significant increase in cancer deaths began to be evidenced in mortality statistics, it was noted that this increase followed, and was probably related to, a decrease of tuberculosis. We find this idea clearly set forth as early as 1902 by Sir T. Coglan[3] in a paper read before the Australasian Medical Congress of that year, in which he said:

"I desire now to place before you certain statistics which seem to connect, in some way, the increase of cancer with the decrease of tuberculosis. I have taken out the deaths from cancer and tuberculosis for each year of life during the last 25 years. It will be apparent that the resultant rates in each group have strikingly constant values. . . . The question therefore naturally presents itself, whether persons who under the conditions of life and of medical science in 1876 would have fallen a prey to tuberculosis, but did not, have not at a later period provided some of the material from which our cancer rate has been recruited. I believe it is a medical axiom that 'morbid diathesis is necessary for the disease weeds to spread.' Then, may not the morbid condition under which in former years phthisis was produced have supplied the conditions under which cancer might, and does, flourish. In other words, are cancer and tuberculosis to be considered as complementary diseases?"

I hope it will not be concluded from my present letter that I now "hotly" advocate the theory that the increase in deaths from lung cancer which has been noted in mortality statistics is due to the concomitant decrease in deaths from tuberculosis. What I do advocate is that, in considering the theory that smoking causes lung cancer and that this explains the recent rise in its reported incidence, available data and opinion which bear against that theory be considered, as well as evidence which bears in its favour. Elsewhere I[1] have presented, in some detail, how this principle should be applied also to some published "prospective" studies. What I do oppose—and with considerable warmth—is the issuance of pronouncements, authoritarian and intimidating, that the theory that smoking causes lung cancer is already conclusively established. What has been "proved" by the accumulated statistical data bearing on the problem is not that smoking causes lung cancer, but that it is merited to set up an investigative programme to ascertain, in a manner convincing to the general scientific community, whether smoking does cause lung cancer. Such a programme will necessarily involve many biological specialties and should be of a scope and intensity commensurate with the awesome importance and complexity of the question with which it is concerned. More important, actually, than just the fact of whether smoking can or cannot cause cancer is a knowledge of the physicobiological factors which are involved and how these operate. Only with a gain of such knowledge will scientific understanding of the disease be advanced, and, through this, the possibility of its effective control and amelioration.—I am, etc.,

Rochester, Minnesota. JOSEPH BERKSON.

REFERENCES

1 Berkson, J., *Proc. Mayo Clin.*, 1955, **30**, 319.
2 Pearl, R., *Amer. J. Hyg.*, 1929, **9**, 97.
3 Coglan, T., quoted by Cherry, T., *Med. J. Aust.*, 1925, **1**, 581.
4 Berkson, J., *J. Amer. statist. Ass.*, 1958, **53**, 28.

Prevention of Lung Cancer

SIR,—Dr. A. C. Woodmansey (*Journal*, July 5, p. 46) may be right in calling smoking one of the less important of our psychological problems, but its sequel in lung cancer is an unpleasant way of dying for the patient in the prime of life, and a time of great stress for his wife who has to bear the brunt of the illness, and for the G.P. who has to pay numerous morale-raising visits.

Dr. Woodmansey says, "It is essential to protect young children from fire and other dangers by external means over which . . . they have no control." This must continue until they are mature enough "to assess the dangers realistically for themselves." Surely it is at this time that they should be given the unpleasant facts about smoking, clearly and bluntly. But is it necessarily too late to do anything about it after that? While agreeing that deliberately frightening children is undesirable, is this true of adults? Is it not an even greater stress to learn that your husband (or yourself, or your father) has inoperable lung cancer?

Dr. Woodmansey goes on to say, "Perhaps the resistance of some smokers to repeated warnings is due . . . to a compulsive need for reassurance that the danger is not after all as serious as the warnings assert," and that "rational therapy demands an understanding of underlying processes and is not achieved by merely trying to abolish symptoms." On this tenuous basis he appears ready to give up any attempt to deal with the problem in adults (and children) who already smoke, and to concentrate on adequate physical and psychological care of children in order to produce healthy adults. This is excellent in theory, but what chance have the children got when so often they see one or both parents smoking, their school teachers smoking, and even their family doctor smoking, not to mention the constant barrage of advertising? Who is going to be responsible for raising these "healthy adults" who presumably do not need the "benefits" of smoking? Surely it is an accepted practice in medicine to treat symptoms until the underlying processes can be got at. Nitrites are not withheld just because the underlying cause of atheroma is unknown. In this case smoking may be a symptom like pain, but because of its unpleasant effects it should be removed.—I am, etc.,

London, S.W.12. D. CONNAN.

Halothane Concentration

SIR,—The ether bottle from a Walton gas machine has wider gas passages and lower flow resistance than the Rowbotham bottle and on this account is more suitable for use in the closed circuit. I described this method using "V.A.M." (1 vol. vinyl ether and 3 vols. ethyl ether) in the *Journal* of August 20, 1949 (p. 436), and in practice still find it giving good results.

It was pleasant to read Dr. C. J. Massey Dawkins drawing attention to the virtues of vinyl ether in the *Journal* (May 10, p. 1116), but halothane has not yet proved itself so safe and the above method is not to be recommended for its administration. Halothane requires accurately controlled dosage, and this is best achieved with reasonable economy by passing a flow rate of two litres per minute through the "fluotec" vaporizer into a leaking closed circuit.—I am, etc.,

Bradford. C. G. BLAKELEY.

Do Sebaceous Cysts Exist?

SIR,—

May we revive the "Wen"
Now that some clever men
Say the Sebaceous Cyst
Really does not exist?

—I am, etc.,

Epping, Essex. PELHAM WARREN.

Tetanus Immunization

SIR,—I have recently completed a six-months appointment in the casualty department of a children's hospital where there was an average of one hundred attendances each day. In those cases of injury in which the risk of infection by tetanus bacilli was considered sufficient to warrant prophylaxis, inquiry was made as to whether the child had already been immunized against tetanus, with the intention of giving such children tetanus toxoid. (In those cases where the child was unaccompanied by a parent, the injection was withheld until the parent could be questioned about this.)

In no single case was the answer given that the child had been immunized against tetanus. There would seem to be little doubt that some parents are not aware of what their child has been immunized against.—I am, etc.,

Liverpool, 12. P. JACKSON.

Unexpected Babies

SIR,—The report from your obstetric correspondent in your medico-legal column (*Journal*, July 5, p. 54) prompts me to record a recent case of interest.

I was called to see a multiparous woman who it was said had had twins. On arrival I learned that the 25-year-old patient had felt the need to go to stool and having gone had become aware for the first time that she was about to deliver a child. On retiring to bed she had with her husband's assistance delivered herself of a 6½ lb. (3 kg.) girl who was very shortly followed by a 5½ lb. (2.5 kg.) boy. The cords had been successfully tied by her husband. All that remained was to await the spontaneous delivery of a large placenta and to repair the lacerated perineum.

The patient had had irregular periods for three years since the birth of a previous child and had thought nothing of her amenorrhoea for four months prior to delivery. She strenuously denied having felt any movements or having noted any increase of girth. She had no pain throughout the confinement. Neither her husband (not unintelligent in these matters, to judge from his efficient conduct of the delivery) nor her neighbours admitted to having any idea of the state of affairs. The patient had had no decided views on having more children but is delighted with her twins, both of whom are thriving three months later.

—I am, etc.,

Bathgate. DAVID M. MCCURRACH.

Compulsory Crash-helmets

SIR,—Time and again one sees the terrible havoc caused by motor-cycle accidents. Time and again the story is the same—boys and young men brought into hospital with head injuries so severe that it seems impossible that they will ever recover; in fact many do not; and all this very largely because they were not wearing crash-helmets. Surely, Sir, to make a motor-cyclist wear a crash-helmet is no more of an infringement of his personal liberty than it is to make an industrial worker wear protective clothing or to make a ship's passengers do boat-drill.

Looking at the problem from a more practical and possibly rather cynical point of view, the amount of time and money spent on the nursing and rehabilitation of these patients is enormous, and at a time when our Health Service already costs £750m. a year this extra and "unnecessary" expenditure is an outlay we cannot afford. If these young men will not take reasonable precaution to protect themselves of their own accord they must be made to do so by the community. The law would be easy to enforce—one warning and then a summons.—I am, etc.,

Worthing, Sussex. P. J. G. SIMONS.

London Medical Orchestra

SIR,—I would crave the courtesy of your columns to bring to the notice of the musically minded the London Medical Orchestra, who are anxious to recruit players for the coming season starting in October.

There is something particularly enjoyable in the amateur orchestra, and some great figures in our profession have found it a refreshing distraction; two who come readily to mind were His and Billroth (the friend of Brahms). Moreover, the present President of the College of Physicians is at times observed performing valiantly in our ranks under the proficient conductorship of Dr. Ucko.

With the help of distinguished soloists this orchestra has raised over £400 this year for the Imperial Cancer Research Fund by public concerts, and will continue to help medical charities. Dr. E. V. Slaughter of 6, Oxford Court, London, W.3, would be glad to hear from any who are interested.—I am, etc.,

London, W.1. A. DICKSON WRIGHT,
President,
London Medical Orchestra.

Obituary

Sir VICTOR HURLEY, K.B.E., C.B., C.M.G.
M.D., M.S., F.R.C.S., F.R.A.C.S.

Sir Victor Hurley, consulting surgeon to the Royal Melbourne Hospital and chairman of the board of the Walter and Eliza Hall Research Institute, died on July 17. He was 70 years of age.

We are indebted to Sir GORDON GORDON-TAYLOR for the following tribute: To-day Australia and especially Melbourne mourn the death of a prominent Australian surgeon. Born in 1888, Sir Victor Hurley had reached the Biblical threescore years and ten and had crowded much into his active life. Educated at Wesley College, Melbourne, and at "Queen's," "Vic" Hurley qualified in 1909 and obtained his M.S. of Melbourne University in 1913. He was a member of a most distinguished year at the university, which included men like the late Sir Alan Newton and Sir William Upjohn: with any reference to the Royal Melbourne Hospital the names of Hurley, Newton, and Upjohn come automatically to one's lips. He was a first-class surgeon in whom all reposed the greatest confidence: he was not of the "daimonic" type, sweeping aside former well-tried methods and promulgating new ones, not the pioneer, but the man whose care of his patient was a sacred trust, even if it involved repeated telephone messages from Melbourne to London over a member of the nursing profession who had been his patient. I met him first in the casualty clearing zone in France in 1917, and subsequently examined him in the anatomy part of the Primary Fellowship examination, along with a particularly able group of young Australians who had remained on in Europe after the 1918 armistice.

"Vic" Hurley was essentially a man of affairs, and from the time of the 1914–18 war, when he became Assistant Director Medical Services, Australian Imperial Forces, his administrative flair placed him in a succession of responsible offices, which included the presidencies of the Royal Australasian College of Surgeons and of the Federal Council of the British Medical Association. During the 1939–45 war he was Director-General of Medical Services of the Royal Australian Air Force and for a time was chairman of the Australian Red Cross Society. He was knighted in 1950, the year in which he was president of the British Commonwealth Medical Conference.

His connexion with the Royal Melbourne Hospital was a long and honourable one, and finally he became its president. Like Hugh Devine, Harold Dew, Henry Newland, and Henry Searby, he was elected an Honorary Fellow of the Association of Surgeons of Great Britain and Ireland. He probably lacked the Roman *gravitas* which so distinguished his friend and contemporary Alan Newton, but he was a man of transparent honesty of purpose, readily approachable, and of extreme courtesy. In the words of Horace, he was *vir tenax propositi*, and with the loyal help of the Chief Censor, Henry Searby, the Royal Australasian College of Surgeons prospered in his term of presidency.

He was married to a charming lady, who survives him, and he leaves four sons and two daughters, some of whom are in the medical profession.

F. M. B. writes: Victor Hurley was one of a famous group of young Australian surgeons who came to prominence in the first world war. My first contact with him was when I was a student in the early 1920's. That was in the Melbourne Hospital, now the Royal Melbourne, an institution with which Hurley's name will always be associated. He saw at first hand every aspect of its activity and development from his student days right up to his period of service as president of the hospital in recent years. Hurley was not only a highly competent surgeon but had a real flair for

administration, and throughout his career he carried administrative responsibilities in a variety of fields with success. His work as head of the R.A.A.F. medical services during the war and his unceasing concern for the progressive development of the new Royal Melbourne Hospital in its relation to the medical school in the post-war years were the most important. My own association with him was closest during the last five years, when he was chairman of the board of the Walter and Eliza Hall Institute. He was not directly interested in research, but he had a full realization of its importance as a leaven to the hospital's direct responsibilities for effective patient care and teaching, with which he was primarily concerned. Under his leadership the board meetings were happy and uneventful. Perhaps that was Victor's greatest gift—of preventing situations from developing. He was an immensely likable person, very good-looking, and retaining a deceptively youthful appearance right up to his last year of partial incapacitation, and with a friendly approach that always seemed to strike the right note. He was a good citizen in every sense of the word, and he was happy in the community's recognition of his work.

A. MEARNS FRASER, M.D., D.P.H.

Dr. A. Mearns Fraser, a former medical officer of health for Portsmouth, a post he held for 38 years, died in the Royal Portsmouth Hospital on July 8. He was 90 years of age.

Born at Reading on January 5, 1868, Andrew Mearns Fraser was educated at the City of London School, where he played in the school XV and was fives champion. From school he went to Edinburgh University, where he graduated M.B., C.M. in 1893, proceeding to the M.D. in 1902. At the University he was lightweight boxing champion. After experience which included that of assistant to Dr. Thresh, county medical officer for Essex, he took the D.P.H. at Cambridge in 1895. In 1896 he was appointed medical officer of health to the Borough of Portsmouth, where he remained until 1934. He acted as secretary to the Section of Public Medicine when the Association held its Annual Meeting at Portsmouth in 1899, and when the Annual Meeting was again held there in 1923 he was appointed president of the Section of Public Health. He was chairman of the Portsmouth Division of the B.M.A. from 1925 to 1927. He was also an active member of the Society of Medical Officers of Health, of which he was Fellow and at one time a member of its council.

T. E. R. writes: When appointed medical officer of health to the Borough of Portsmouth—as it then was—Dr. Fraser was the youngest of 32 doctors who applied for the position. He held office for 38 years, during which period Portsmouth more than doubled in size, the population increased by over 70,000, and in 1926 achieved the status of a city. Soon after his appointment a new era in public health began with the turn of the century, the work of the public health department, which had hitherto been concerned mainly with sanitation and environmental hygiene, was gradually extended to include not only the prevention of disease but those personal health services with which most people are to-day familiar. Fraser quickly became a pioneer in the campaign against tuberculosis, and in June, 1911, there was opened, in a gardener's cottage that happened to be empty in the Victoria Park, the first municipal tuberculin dispensary in the country. A more permanent building was subsequently provided on an adjoining site, at a contract price of £296, as tuberculin was then considered "the most effectual remedy for tuberculosis."

In 1912 Fraser was appointed a member of the Departmental Committee on Tuberculosis. Later, in 1925, he was associated with the late Sir John Rowland's scheme to provide treatment for children crippled by tuberculosis and other diseases at the Lord Mayor Treloar Hospital, Alton. His campaign against venereal diseases is still remembered, mainly because his advocacy of immediate self-disinfection brought him into conflict with those who felt such preventive measures might encourage immorality. At a public conference people who had attended to demonstrate their hostility went away satisfied about the wisdom of the measures which he proposed. His recommendation of a public abattoir was one of the few which were not adopted during his period of office, but this has now come to fulfilment.

Fraser soon pressed for the purification of the city's water supply by filtration, and under a Parliamentary Bill in 1906 the present eight filter-beds on Portsdown Hill at Farlington were constructed, since when the water supply of Portsmouth has been above reproach. On many occasions he issued warnings against eating sewage-polluted shellfish. Nevertheless, 85 persons attending the mayoral banquet in 1922 suffered from illness through eating oysters. Following outbreaks of diarrhoea amongst schoolchildren in 1902 the uncontrolled tipping of refuse was discontinued. Maternity and child welfare services were established, and under slum clearance orders over 1,000 houses were demolished as unfit for habitation. During the whole period while he held office there was no great epidemic of disease, except for the outbreak of influenza in 1918, from which the whole world suffered, causing 713 deaths in Portsmouth. The decline in the death rate from infectious disease during his period of office resulted in a saving of nearly 500 lives a year, a large proportion of these being infants and young children.

Mearns Fraser was a handsome man of great personal charm and courtesy, well liked by his staff and esteemed by all with whom he associated. While he was most meticulous in his work and always expected the best, he was scrupulously fair and ever ready to give help or guidance to those who sought it. Always a keen golfer, he moved on retirement to Hayling Island near the golf course, where he spent much of his leisure. During the war years he was captain of the club and, until a year ago, its president. Carpentry was another of his hobbies, and he made a large number of artistic pieces of furniture. He married, in 1896, Freda Mary, daughter of E. W. Phibbs, and they celebrated their diamond wedding two years ago. They had two daughters.

J. WHITE, B.Sc., M.B., Ch.B., D.M.R.E.

Dr. J. White, consultant radiologist to the Stracathro and Brechin Hospital Group, died suddenly at his home in Edzell on June 1. He was 44 years of age.

James White was born at Aberfeldy on October 29, 1913. He was the son of a schoolmaster who later became rector of Bellshill Academy. He received his education at Hamilton Academy, where he was considered to be one of the finest mathematicians that had passed through the school. He then went to Glasgow University, where he graduated B.Sc. in 1934 and M.B., Ch.B. in 1938. Following a hospital resident post, he became interested in radiology and took the D.M.R.E. of Liverpool University in 1941, and worked in Liverpool Royal Infirmary and in Alder Hey Hospital until 1943. From 1943 to 1946 he worked in Stockport Infirmary and Salford. This was then followed by two years as a specialist in radiology in the Army with the rank of major. 1948 saw him back in Stockport Infirmary, and in 1950, he became consultant radiologist at the City General Hospital, Stoke. In 1956 he became full-time consultant radiologist to the Stracathro and Brechin group of hospitals, and finally made his home in Edzell.

James White was a hard worker and a keen student of his specialty, but he was interested in all other departments. He set himself high standards, and this was reflected both in the films he produced and in his reports. The limited construction of buildings during the war, with the inevitable cramped quarters and overlapping of departments, left a

post-war need for expansion and reconstruction. When Jimmy White arrived this expansion programme began to come on the horizon, and with characteristic zeal he set to, in consultation with others, making plans for a totally new radiological department; and now others will build on his foundations.

Beyond all the material things was his personal interest in his patients. He would go out of his way to explain to them what he intended doing, and would visit them afterwards to ask their reactions. Patients appreciated these things. His death in the prime of life came as a profound shock to us all. He is survived by his widow and two children. His brother, W. F. White, is a consultant orthopaedic surgeon at Law Hospital, Carluke.—R. L.

C. J. MORGAN, B.Sc., M.B., B.Ch., D.P.M.

Dr. C. J. Morgan, consultant psychiatrist and medical superintendent of Morgannwg Hospital, Bridgend, Glamorgan, died on June 26. He was 43 years of age.

Cyril John Morgan was born at Penydarren, Merthyr Tydfil, Glamorgan, on December 22, 1914. He was educated at Cyfartha Grammar School, Merthyr, and thence he went to the Welsh National School of Medicine, Cardiff, where he graduated M.B., B.Ch. in 1939. He had obtained the B.Sc. with honours in anatomy in 1936. In 1947 he obtained the D.P.M. of University of London. Following qualification, he became R.M.O. at the Pontypool Hospital from June until September, 1939, when he joined the R.A.M.C. on the outbreak of war. After service as a regimental medical officer, he was appointed a psychiatric specialist, and served in this country and in West Africa until he was demobilized in December, 1945. He next joined the staff at Rainhill Hospital, Liverpool, where he became first senior assistant. In addition, he was lecturer in psychiatry to the Liverpool School of Occupational Therapy, and examiner in psychopathology to the Society of Occupational Therapists. In December, 1949, he was appointed deputy medical superintendent to Morgannwg Hospital, Bridgend, and in November, 1954, he became medical superintendent.

Morgan was a truly dynamic personality, and he will ever live in the memory of all who knew him for his innate kindliness, his ever-ready help, his seemingly tireless energy, and his infectious enthusiasm. He was a brilliant and stimulating conversationalist, and had an exceedingly wide range of interests. His patients and staff, as well as his colleagues, had a deep and abiding affection for him, and his untimely death at the early age of 43 years is a most tragic loss to Morgannwg Hospital. Our heartfelt sympathy goes out to his widow and three young sons.

ISIDOR C. RUBIN, M.D., F.A.C.S.
Hon.F.R.C.O.G.

The obituary of Dr. Isidor C. Rubin was printed in the *Journal* of July 19 (p. 168).

Dr. BETHEL SOLOMONS writes: Isidor Rubin was indeed a beloved physician. Among his numerous attributes he was an essential humanist and had a delightful sense of humour. In the last 50 years he has been a pioneer investigator in his efforts to improve the lot of childless women, and he never ceased trying out new methods. His *Collected Papers, 1910–1954*, were published during the latter year and these 132 communications will be a lasting monument to his memory. He had resigned from the Mount Sinai Hospital, for which he had done so much, but was still in private practice. His experimental work was his chief joy. He was one of my oldest and dearest friends, and when he entertained me in New York about six weeks ago he seemed to be in splendid health and was as enthusiastic as ever. I know how lucky I was to be with him on this last occasion, for he was leaving two days later for meetings in Mexico and London. He will be sadly missed by his devoted wife and by colleagues and friends in every part of the world.

Medical Notes in Parliament

DOCTORS IN PARKING METER AREAS

Earl HOWE asked in the Lords on July 15 whether, in the rules governing the operation of parking meters in areas where they were installed, the Government intended to make any special regulations to meet the needs of professional men, their clients, or their patients.

Lord MANCROFT, Minister without Portfolio, said that no special provision for professional men, their clients, or patients was proposed by the local authority or included in the only parking meter Order so far made—the Parking Places (Westminster) (No. 1) Order, 1958, which was operating in North-west Mayfair. Any local authority proposing such an Order might include in it such exemptions under Section 21(4) of the Road Traffic Act, 1956, as they wished, but he could not anticipate the Minister of Transport's decisions on such applications.

Earl HOWE asked if Lord Mancroft did not think that in the case of people, perhaps suffering from grave injuries, who were going to see their medical advisers some relaxation of the parking meter regulations should be incorporated in any further Orders made for the same purpose. Lord MANCROFT said that what mattered was what representations were made by the local authorities to the Minister when he had heard all the interests concerned. In the particular case to which he had referred he understood that no representations were made, and on the only other Order before the Minister representations along the lines which Earl Howe suggested had been made. The matter was still under consideration. Earl HOWE said that, in common humanity, something ought to be insisted on by the Minister of Transport in any further Orders which were made on the subject. Lord MANCROFT replied that, if in common humanity the Minister was asked to do so, indeed he would consider it: but in the only case so far put into practice he had not been asked.

Lord DERWENT asked if this meant that it was impossible for the Minister to draw the attention of the local authority to the question and ask them to consider it. Lord MANCROFT said that the local authority principally concerned in the matter—namely, the St. Marylebone Borough Council, in whose area Harley Street was—did not need to have this matter drawn to their attention. They were powerfully aware of it, and they had made representations to the Minister and he was considering them.

Earl HOWE suggested that there were a number of professional men, doctors and others, living in Westminster No. 1 area. Surely the Minister could have taken action on his own account in a case like that. Lord MANCROFT agreed that the Minister could have taken action, but he did not think from the facts before him that it was necessary.

QUESTIONS IN THE COMMONS

Delays in Obtaining Treatment

Mr. W. OWEN (Morpeth, Lab.) asked the Minister of Health on July 14 if he was aware that the payment of a specialist fee by mineworkers in the Ashington area of Northumberland determined the speed of the treatment needed. Mineworkers scheduled for specialist advice, medical treatment, or surgical treatment under the Health Service were subject to unusually long waiting periods. Mr. D. WALKER-SMITH said that he knew the waiting periods for treatment at the Ashington Hospital were sometimes long and the facilities there were to be extended. He was not quite sure what Mr. Owen had in mind regarding specialists' fees: there were no pay beds in this hospital.

Mr. OWEN explained that two brothers had waited for nine weeks for an appointment for diagnosis. One paid a specialist fee of £3 and got an appointment within four days, and the other continued to wait. Mr. WALKER-SMITH said that in view of these allegations Mr. Owen had better

send him the particulars. Mr. F. POPPLEWELL (Newcastle upon Tyne, West, Lab.) said quite a lot of this sort of thing was taking place in the north-east. A miner had been waiting 14 weeks for an operation for double hernia, and was then told he would have to wait another six weeks, but that if he paid three guineas to a specialist he would be taken in at once. Mr. WALKER-SMITH undertook to look at any case sent to him.

Dr. EDITH SUMMERSKILL asked for the Speaker's guidance on the point of privilege. If a Member wrote to the Minister he would have to give the name of the physician and the details. Should he respond to the Minister's request and send the letter, which might mean defaming the consultant? The Speaker said this matter had started with a question in Parliament, of which the Member had given notice. There was no doubt that this question was a proceeding in Parliament.

Poliomyelitis Vaccine for Travellers

Mrs. EIRENE WHITE (Flint, East, Lab.) asked what arrangements were made to supply poliomyelitis vaccine to adults travelling to parts of the world where danger of infection is high. Mr. WALKER-SMITH replied that there were at present no comprehensive arrangements for this under the Health Service, but certain classes of travellers were covered by arrangements made by the Foreign Office, Commonwealth Relations Office, Colonial Office, and the Service Departments.

Mrs. WHITE suggested that something much more specific was required. There had been cases in Pakistan, Indonesia, and elsewhere where British women had gone without protection and had died, sometimes after an illness of only two days. Adequate arrangements should be made to protect people before they went to places where polio was endemic, and these should be publicized to travel agencies. Mr. WALKER-SMITH pointed out that in approaching vaccinations on a priority basis he had acted on the advice of the committee under the chairmanship of Lord Cohen of Birkenhead. He was prepared to take this point to the committee and take their advice on it.

Registrations for Polio Vaccination

Sir LEONARD ROPNER (Barkston Ash, Con.) asked the Minister what was the approximate number of children who had been registered for injections against poliomyelitis since January 1 and June 1, 1958; and what would be the total cost of these inoculations. Mr. WALKER-SMITH told him that information for these periods was not available, but the number of children who were registered between January 1 and April 30, 1958, was approximately 1¼ million, and figures for the period May 1 to June 30 would be available shortly. He could not give any precise estimate of cost, including that incurred by the local health authorities, but the cost of the vaccine for two injections each for the 1½ million children was likely to be rather over £500,000.

Out-patient E.C.T.

Dr. DONALD JOHNSON (Carlisle, Con.) asked if the Minister of Health would increase the facilities for the administration of electric convulsion therapy in the out-patient departments of general hospitals. Mr. WALKER-SMITH said that these facilities were being provided by the responsible hospital authorities as their resources permitted.

Dr. JOHNSON asked the Minister to further this type of treatment. There would be an obvious saving of hospital beds if it were successful. On occasion there were complaints from people who suffered from after-effects which they attributed to rather intensive courses of treatment in hospitals—sometimes against their own will—and out-patient treatment would allow them to consult their family doctors from time to time and thus obtain an independent opinion. Mr. WALKER-SMITH said there was an increasing tendency for patients suffering from mental illness to be treated in out-patient departments. The logical corollary was that there should be more facilities for electric convulsion therapy.

Alcohol and Road Accidents

The MINISTER OF HEALTH explained in answer to Mr. SOMERVILLE HASTINGS (Barking, Lab.) and Sir FRANK MEDLICOTT (Norfolk, Central, Ind.) that the Medical Research Council report on the effect of alcohol on driving capacity was being revised by the author on the advice of the scientific panel under whose auspices the research was carried out. The object of the revision was to correct minor errors and simplify the presentation of the statistics. There was every intention of publishing the report. It might be possible to have a preliminary publication of the main findings in a form suitable for scientific journals.

Health Centres

Mr. A. BLENKINSOP (Newcastle upon Tyne, East, Lab.) asked what was the total number of health centres in operation, under construction, and planned respectively; and what action was being taken to encourage their further development. Mr. R. THOMPSON, Parliamentary Secretary, Ministry of Health, informed him that nine health centres established by local health authorities since the appointed day were in operation. Three were under construction, and another would be started this year. Nine other schemes had been proposed, and three at least of these were likely to be started in 1959–60. The Minister was always prepared to consider proposals for more of these centres within the limitations on capital expenditure, but it was right that the initiative should be taken locally.

Registration of Chiropodists

Dr. DONALD JOHNSON asked the Minister when he expected to introduce new legislation with a view to the regularizing of the present position in the chiropody profession; and if he would include in such legislation provisions to safeguard the position of those who had been earning their living as practising chiropodists and could produce satisfactory medical evidence to that effect. Mr. WALKER-SMITH said that the Secretary of State for Scotland and he had recently drawn up a revised scheme for the statutory registration of professions supplementary to medicine, which would require legislation to bring it into effect. It had recently been considered at a conference of all the bodies concerned and they were now considering the views then expressed.

Safety Branch of A.E.A.

Mr. R. MASON (Barnsley, Lab.) asked the Paymaster-General to what extent a safety inspectorate had now been formed to examine periodically and keep under review safety conditions within the atomic power stations and allied establishments; and whether he was satisfied that sufficient emphasis was being placed on this development. Sir I. HOROBIN said he was. The Safety Branch of the Atomic Energy Authority was being strengthened in accordance with the recommendations of the Fleck Committee, and the Government were preparing legislation to implement the policy of licensing and inspection already outlined.

Detergents in Sewage

Mrs. H. SLATER (Stoke-on-Trent, North, Lab.) asked the Minister of Housing and Local Government on July 15 what results there were from his examination of the new washing powder which ceases to foam once it gets into the sewage. Mr. J. R. BEVINS, Parliamentary Secretary, said that the foam problem was being studied by the standing technical committee on synthetic detergents. The committee was aware of recent reports that new materials had been discovered, and, in co-operation with the manufacturers and the Department of Scientific and Industrial Research, was investigating the claims made for these materials. The committee was not yet ready to make a further report. He hoped they would have the report before the end of the year.

Meat Inspection

Sir FRANK MEDLICOTT (Norfolk, Central, Ind.) asked the Minister of Agriculture, Fisheries, and Food on July 17 if he was satisfied with the progress of the efforts to ensure that 100% of the meat passing through slaughterhouses was inspected. Mr. J. B. GODBER, Parliamentary Secretary, stated that the replies to a questionary recently issued by the Ministry indicated that local authorities had made considerable progress during the last 18 months, and that as much as 90% of the meat passing through slaughterhouses was now inspected. Local authorities were to be congratulated on this encouraging rate of progress, and the Minister was satisfield that they were doing their best to maintain this progress and to raise the standard of inspection despite the great pressure on inspecting staff in many areas.

Scottish Medical Students

Mr. MALCOLM MACPHERSON (Stirling and Falkirk, Lab.) asked the Secretary of State for Scotland how many medical students in Scotland satisfactorily completed their courses at the recent final examinations; how many of these he estimated were likely to take pre-registration posts in Scottish hospitals; and how far this estimate corresponded to the number of vacancies in such posts. Mr. J. S. MACLAY said he was informed that 354 medical students in Scotland successfully completed their courses at the recent final examinations. No information was available of where these graduates would take their pre-registration training. There were some 600 house-officer posts in Scottish hospitals approved for pre-registration service. There was, however, no direct relationship between this number and the number of recent passes. Some Scottish graduates went to England and abroad for their pre-registration training, and similarly graduates from other countries came to Scottish hospitals; moreover, some of the posts were filled by graduates who qualified earlier.

New Measures at Broadmoor

The MINISTER OF HEALTH announced on July 21 that, although he had not yet received the full report of the Board of Control inquiry into the escape of Frank Mitchell from Broadmoor, he had received a summary of their main findings. They confirmed that the method of escape was as he had said, and they found that the saw used by the patient had been introduced into the institution from outside. He continued that they recommend that: (1) Search of patients after visiting-days should be intensified. (2) There should be no exception to the rule that the siren was to be sounded immediately the escape of a dangerous patient was known. (3) The strength of the night staff on duty in the block from which Mitchell escaped should be increased at once. (4) Alterations to the walls of the institution to increase their security at strategic points should be begun immediately. They had already given instructions for the implementation of these recommendations.

Mr. A. R. HURD (Newbury, Con.) said that local authorities and residents, who had been reasonable and understanding, would welcome these practical measures. He asked the Minister to see that the further suggestions they had made in their petition were fully considered by the Board of Control, and if need be have an independent inquiry. Mr. WALKER-SMITH replied that he would certainly study with sympathy and attention any constructive proposals put forward by the local authorities and residents. He doubted whether an independent inquiry could add anything material.

Psychopathic Patients

Mr. HURD asked how many of the patients at Broadmoor were classified as psychopaths with homicidal tendencies; and if further consideration would now be given to detaining them in an institution inside a prison rather than at Broadmoor, where their presence might be inimical to the cure of the majority of the patients. Mr. WALKER-SMITH replied that a psychopathic state might be associated with mental illness or mental deficiency, and, as homicidal tendencies might arise from the associated illness, information in the form asked for was not available. The classification and disposal of patients requiring treatment in a State mental institution would be considered in the context of the promised legislation following the report of the Royal Commission. Mr. HURD asked if he would consult the Home Secretary to see whether it would not be better if the 50 or so psychopaths were put in prison where security could be the first consideration. Mr. WALKER-SMITH pointed out that the matter was not susceptible of the neat classification Mr. Hurd seemed to have in mind. He was advised that the right place for patients who had been sent to Broadmoor from prisons was in Broadmoor. Mrs. BRADDOCK (Liverpool, Exchange, Lab.) said that this type of patient was the one giving the Royal Commission the most difficult task of definition. Would it not be better to look at the recommendations of the Royal Commission and put them into operation? Mr. WALKER-SMITH agreed that this problem did cause considerable difficulty to the Royal Commission. He had been carefully studying their recommendations on the psychopathic state, in the light of the observations that had been made.

Polio Vaccination Extended

Mr. WALKER-SMITH also announced on July 21 that, having reviewed the progress that had been made in the existing programme of vaccination against poliomyelitis, the Government considered that the stage would soon be reached when it could be extended. Accordingly, they proposed that eligibility for vaccination should be extended to persons born in the years 1933 to 1942, inclusive, thus raising the upper age limit from 15 to 25; that a wider range of hospital staff and their families should be brought within the programme; and that a start should be made with third injections for persons already vaccinated with two. The Secretary of State for Scotland and he proposed to consult the local authority associations and the British Medical Association on the details of these extensions, and then to issue all necessary information about them to local health authorities, hospital authorities, and general practitioners. They hoped it would be possible for a start to be made on the new vaccinations by the autumn. Persons affected by the extension of the programme should watch for local announcements telling them when and how to apply.

Mr. A. BLENKINSOP (Newcastle upon Tyne, East, Lab.) asked if it was now possible to increase the amount of vaccine in this country. Mr. WALKER-SMITH stated that there were some supplies of British vaccine likely to be forthcoming in the near future, but still not in any great quantity for the time being. It was therefore wise for parents who wanted immediate protection for their children to opt for the available vaccine.

Medical Staffing of Hospitals

Mr. BLENKINSOP asked the Minister of Health what representations he had had from professional and other bodies regarding the composition of the working party on medical staffing of hospitals. Mr. WALKER-SMITH replied that he had had representations from the Medical Practitioners' Union, the Royal Medico-Psychological Association, and the National Council of Women. Mr. BLENKINSOP asked if the Minister was going to pay any attention to the representations that had been made, in view of the real anxiety among the large number of consultants and specialists who did their work in general hospitals that they had no representation at all on this committee, which consisted entirely of men—no doubt eminent—from teaching hospitals. Mr. WALKER-SMITH replied that all the representations he had received dealt with rather different points, and pointed to the omission of desirable membership as they saw it. If effect were to be given to all these suggestions there would be a danger of having a large and unwieldy committee.

The committee could get information from any source it wanted. Mr. BLENKINSOP said it was essential to carry the medical profession in any recommendations the committee made. How could the Minister expect to do that when it represented only one narrow section of the profession? Mr. WALKER-SMITH pointed out that this working party was a joint body, half appointed by the Minister and the other half by the Joint Consultants Committee. He could not go behind the membership they put forward.

Consultants Strength.—At the end of September, 1957, there were 3,192 whole-time consultants and senior hospital medical officers, compared with 3,170 in June, 1956. The part-time numbers were 5,813 and 5,708.

S.E. Metropolitan Hospitals.—Two hundred and thirty beds in mental deficiency units are out of commission in the South-east Metropolitan Region because of shortage of nursing staff.

Orthodontic Treatment.—During 1957 about 56,000 children received orthodontic treatment through the School Dental Service. In about 27,000 of these cases the treatment began in the year.

Medico-Legal

INQUEST QUASHED

INFANT NOT SUFFOCATED

[FROM OUR LEGAL CORRESPONDENT]

Two weeks ago (*Journal*, July 12, p. 111) we printed a note in this column to the effect that when infants are found dead in their cots their death is less often due to suffocation than is generally supposed. A good illustration is to be found in the case of *Ex parte Groome*, decided in the Divisional Court of the Queen's Bench Division on July 15 (*The Times*, July 16).

In that case a 5-months-old girl was found dead in her cot, and at the inquest evidence was given that death was due to suffocation and a verdict of accidental death was recorded. A post-mortem examination was subsequently held and this showed that the cause of death was not suffocation but toxaemia due to respiratory infection. The deputy coroner for Northampton applied to the Divisional Court for an order to quash the inquisition on the ground that the new evidence showed that the verdict was wrong and that the verdict should have been death from natural causes. The Court quashed the inquisition and ordered that a new inquest should be held. The second inquest was held on July 21 and the verdict of death from natural causes was returned (*Manchester Guardian*, July 22).

Procedure for Quashing Coroner's Inquisition

At Common Law the Court of Queen's Bench has always had the power to quash a coroner's inquisition, and its jurisdiction to do so can be brought into play on the application of anyone who is aggrieved by the verdict. The grounds on which the jurisdiction has been exercised vary from technical shortcomings in the verdict to misconduct by the coroner. It is not usual for an inquisition to be quashed on grounds of insufficiency of evidence to support the verdict or misdirection of the jury by the coroner. The Court will, however, quash in cases of evidential defects if it is satisfied that injustice has been done. The procedure is by motion before the Divisional Court supported by affidavit evidence.

In *Ex parte Groome* the verdict of accidental death due to suffocation, when in fact death was due to respiratory infection, could plainly work precisely the injustice envisaged in our recent note on suffocation in infancy. The deputy coroner's application to the Divisional Court gave the opportunity for the wrong to be put right.

INFECTIOUS DISEASES AND VITAL STATISTICS

Summary for British Isles for week ending **July 5** (No. 27) and corresponding week 1957.

Figures of *cases* are for the countries shown and London administrative county. Figures of *deaths* and *births* are for the whole of England and Wales (London included), London administrative county, the 17 principal towns in Scotland, the 10 principal towns in Northern Ireland, and the 14 principal towns in Eire.

A blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, N. Ireland, and Eire, the Ministry of Health and Local Government of N. Ireland, and the Department of Health of Eire.

CASES	1958 Eng. & Wales	1958 Lond.	1958 Scot.	1958 N. Ire.	1958 Eire	1957 Eng. & Wales	1957 Lond.	1957 Scot.	1957 N. Ire.	1957 Eire
Diphtheria	3	0	3	0		3	0	2	0	1
Dysentery	919	119	125	11	16	462	42	165	15	3
Encephalitis, acute	4	0		0		2	0		0	
Enteric fever:										
Typhoid	1	0	4	1	2	2	0	0	0	1
Paratyphoid	4	1	2(B)	0	1(B)	3	0	2	0	
Food-poisoning	342	29	17	0		327	74	43	0	
Infective enteritis or diarrhoea under 2 years				14	24				20	23
Measles*	6,438	483	62	54	15	15,510	427	67	105	156
Meningococcal infection	21	0	16	1	1	23	2	13	4	
Ophthalmia neonatorum	17	0	6	0		42	5	10	0	
Pneumonia†	232	9	126	6		266	15	115	4	
Poliomyelitis, acute:										
Paralytic	30	2	12	1	8	68	4	9	8	2
Non-paralytic	18	0				65	6			
Puerperal fever§	183	31	11	0		201	29	6	0	
Scarlet fever	663	54	57	17	33	400	25	51	22	4
Tuberculosis:										
Respiratory	534	61	117	18		550	48	142	30	
Non-respiratory	60	5	11	4		60	8	15	2	
Whooping-cough	820	33	60	47	41	1,631	60	99	4	40

DEATHS	1958 Eng. & Wales	1958 Lond.	1958 Scot.	1958 N. Ire.	1958 Eire	1957 Eng. & Wales	1957 Lond.	1957 Scot.	1957 N. Ire.	1957 Eire
Diphtheria	0	0	0	0	0	No comparable figures available.	0	0	0	0
Dysentery	0	0		0			2		0	
Encephalitis, acute		0			0		0			0
Enteric fever	0	0	0	0			0	0	0	
Infective enteritis or diarrhoea under 2 years	4	0	0	0	0		1	1	0	0
Influenza	14	1	0	0	0		2	0	0	0
Measles		0	0	0	0		0	0	0	0
Meningococcal infection		0	0				0	1		
Pneumonia	324	24	16	11	5		25	14	12	4
Poliomyelitis, acute	2	0		0	0		0		1	0
Scarlet fever		0	0	0	0		0	0	0	0
Tuberculosis:										
Respiratory	75	2	5	1	2		7	1	0	3
Non-respiratory		0	0	0	0		1		0	0
Whooping-cough	1	0	0	0	0		0	0	0	0
Deaths 0–1 year	290	22	27	5	10		31	27	4	6
Deaths (excluding stillbirths)	8,569	682	535	110	137		746	507	93	143
LIVE BIRTHS	14,196	1251	882	204	416		1198	1068	225	396
STILLBIRTHS	285	23	26				19	18		

* Measles not notifiable in Scotland, whence returns are approximate.
† Includes primary and influenzal pneumonia.
§ Includes puerperal pyrexia.

Vital Statistics

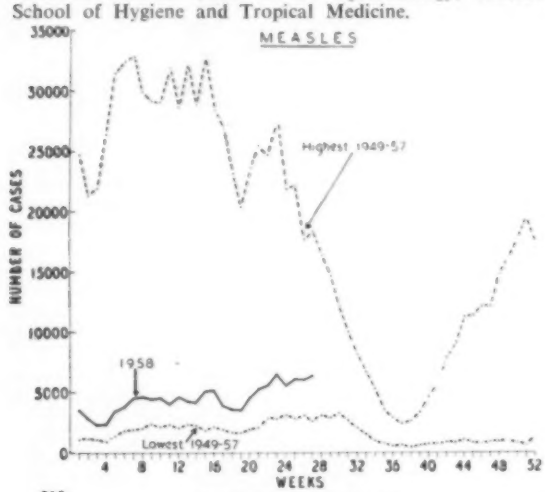
Scotland in First Quarter

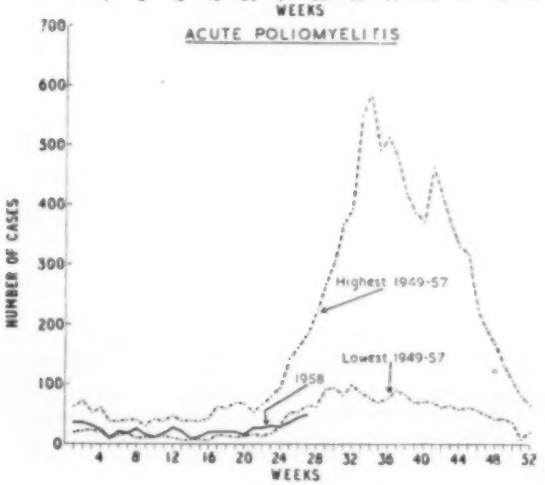
The birth rate for the first quarter of 1958 was 19.7 per 1,000 population and was 1.0 above the average of the five preceding first quarters. The infant mortality rate was 32 per 1,000 registered births, which was the same as in the preceding first quarter. The death rate was 14.6 per 1,000 of the population, being 1.9 higher than in the corresponding quarter of 1957 and 0.4 above the five years' average.

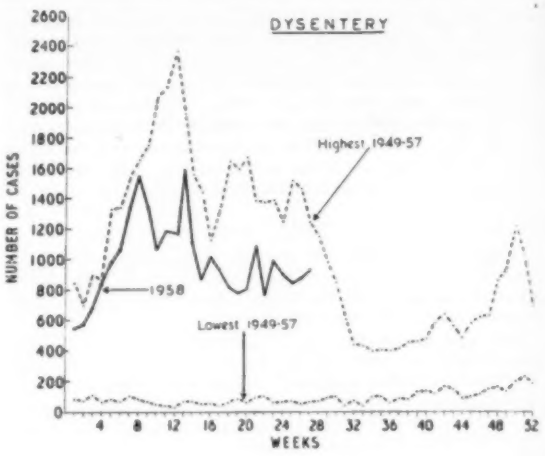
Deaths attributed to the principal epidemic diseases numbered 89 and included 79 from influenza, 7 from meningococcal infections, and 3 from whooping-cough. There were 219 deaths from respiratory tuberculosis and 10 from other forms; these deaths were, respectively, 16 more and 5 fewer than in the first quarter of 1957. Deaths from violence numbered 746 and were 52 more than in the preceding first quarter. 159 of these deaths were due to road transport accidents compared with 103 in the first quarter of 1957.

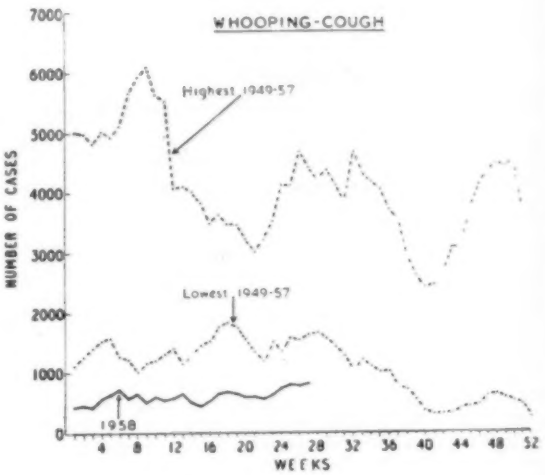
Graphs of Infectious Diseases

The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported in each week during the years 1949–57 are shown thus ------, the figures for 1958 thus ————. Except for the curves showing notifications in 1958, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.









Week Ending July 12

The largest falls in the numbers of notifications of infectious diseases in England and Wales during the week ending July 12 were 179 for dysentery, from 919 to 740, and 115 for food-poisoning, from 342 to 227; the only large rise was 640 for measles, from 6,438 to 7,078.

The largest rises in the incidence of measles were 135 in Derbyshire, from 152 to 287 (Ripley U.D. 109, Derby C.B. 80), 111 in Sussex, from 162 to 273 (Littlehampton U.D. 87), and 110 in Staffordshire, from 137 to 247 (Walsall C.B. 81); the largest falls were 77 in Cornwall, from 226 to 149, and 73 in Somersetshire, from 210 to 137. 625 cases of scarlet fever were notified, being a decrease of 38 compared with the preceding week; there were no large fluctuations in the local returns. The notifications of whooping-cough, 816, were 4 fewer than in the preceding week, and the largest fluctuation in the local returns was a rise of 29 in Sussex, from 42 to 71. No case of diphtheria was notified; in the preceding week there were 3.

Of the 18 cases of typhoid fever 7 were notified in Dorsetshire, Melcombe Regis M.B., and 6 in Wiltshire, Warminster U.D.

The notifications of acute poliomyelitis numbered 59, and these were 5 more for paralytic and 6 more for non-paralytic cases than in the preceding week. The largest returns were Yorkshire West Riding 22 (Bradford C.B. 4, Leeds C.B. 3, Selby U.D. 3, Huddersfield C.B. 2, Moseley M.B. 2, Pontefract M.B. 2), London 4 (Kensington 2), Essex 4 (Rochford R.D. 3), Warwickshire 4 (Birmingham C.B. 4).

The largest centres of dysentery were Yorkshire West Riding 155 (Bradford C.B. 26, Leeds C.B. 20, Barnsley C.B.

19, Sheffield C.B. 18, Thorne R.D. 12, York C.B. 11), Lancashire 143 (Liverpool C.B. 34, Manchester C.B. 29), London 91 (Bermondsey 29, Islington 10), Durham 35 (Darlington C.B. 9), Staffordshire 34 (Rugeley U.D. 13), Warwickshire 33 (Birmingham C.B. 18), Middlesex 30, Surrey 22, Yorkshire North Riding 22 (Middlesbrough C.B. 21), Gloucestershire 20 (Bristol C.B. 19), and Hampshire 20.

Medical News

International Federation of Surgical Colleges.—The Federation was formally inaugurated in Stockholm on July 4. It is representative of surgical colleges, academies, and surgical institutions throughout the world, but not of individual persons. The foremost of its stated objects are: (1) The establishment and maintenance of close relations among approved surgical colleges and kindred institutions; and (2) encouragement of the maintenance of high standards of education, training, and research in surgery and its allied sciences. At the meeting in Stockholm Sir HARRY PLATT was elected president for the ensuing three years, and Dr. I. S. RAVDIN (U.S.A.) and Dr. E. DAHL-IVERSEN (Denmark) were elected vice-presidents. The executive committee in the first instance will consist of representatives from Holland, France, Sweden, Norway, Belgium, and Australasia, in addition to the president and vice-presidents. The member institutions are as follows: Academy of Surgery of Paris, American College of Surgeons, Belgian Surgical Society, College of Physicians, Surgeons, and Gynaecologists of South Africa, Danish College of University Surgeons, Dutch Association of Surgeons, Italian Surgical Society, Norwegian Surgical Association, Royal Australasian College of Surgeons, Royal College of Physicians and Surgeons of Canada, Royal College of Surgeons of Edinburgh, Royal College of Surgeons of England, Royal College of Surgeons in Ireland, Royal Faculty of Physicians and Surgeons of Glasgow, and the Swedish Surgical Society. The secretary of the Federation is Mr. KENNEDY CASSELS, of the Royal College of Surgeons of England.

Polio Vaccination.—The following information on the vaccination state against poliomyelitis in Great Britain, as at June 30, was released by the Ministry of Health this week:

(1) Total registered all groups, 6,570,157 (children up to 15 years, 5,613,602); (2) total vaccinated with two doses, 4,481,837 (children, 4,396,382); (3) total vaccinated with one dose, 856,388 (children, 813,569); (4) awaiting vaccination, 1,231,932 (children, 1,217,220); (5) number of doses needed to complete registrations at June 30, 3,320,252; (6) number of doses held by local authorities at June 30, 3,766,651; (7) number of doses distributed since June 30, 500,000; (8) the registration rate for children under 15 at June 30 was 53.6% (England and Wales 53.3%; Scotland 55.6%); (9) registration by persons in the existing priority groups are still being made; (10) estimated numbers in new groups: age 15–24, 6,250,000; hospital staffs and families, 500,000; (11) those eligible up to March 31, 1959, for a third injection may total 6,500,000; (12) it is proposed to ask local health authorities to make, so far as is practicable, an early offer of third injections to children who were vaccinated in 1956, about 200,000; (13) it is proposed that third injections should generally be offered not less than seven months after the second; (14) total number of doses of vaccine issued from May, 1956, up to July 20, 1958: British, 5,258,568; Salk, 10,452,417; totals, 15,710,985; (15) included in the total of Salk vaccine are 5,637,717 doses tested and licensed for use in America but not further tested by the Medical Research Council.

Ciba Laboratories Ltd.—On July 16 the MINISTER OF HEALTH, Mr. DERFK WALKER-SMITH, opened an extension to Ciba Laboratories' pharmaceutical factory at Horsham in Sussex. As part of the proceedings the Minister inaugurated production of a new drug against leprosy, Ciba 1906 (4-butoxy-4'-dimethylaminodiphenyl thiourea), which has been undergoing clinical trials for the last 3½ years, mainly in Nigeria. At the subsequent luncheon Sir ARTHUR VERE HARVEY, chairman of the Company, announced the setting up of a new Trust Fund, to be known as the Ciba Fellowship Trust. Its object is to help graduates and undergraduates from the United Kingdom and Eire to continue their scientific studies at Continental centres. The Trust will provide for 10–12 fellowships a year in chemistry, physics, or an allied subject, starting next year. The trustees are LORD HIVES, C.H., the former chairman of Rolls Royce, Ltd., Sir ALEXANDER TODD, F.R.S., and Sir ARTHUR VERE HARVEY. Congratulating the company on the extensive and protracted clinical trials to which their new product had been subjected, Mr. WALKER-SMITH said: "In my view, this sort of approach is the essence of reputable pharmaceutical endeavour." In reply, Mr. PHILIP MAIR, the managing director, said that Ciba spent nearly £3m. last year on research towards the discovery of new drugs, twice what they were spending seven years ago.

Chair of Medicine at Edinburgh.—Dr. K. W. DONALD, reader in medicine at Birmingham University, is to succeed Sir STANLEY DAVIDSON when he retires from the chair of medicine at Edinburgh University on March 31. Dr. Donald was educated at Cambridge and St. Bartholomew's Hospital, qualifying in medicine in 1936. After graduating M.B., B.Chir. (Cambridge) in 1938 he obtained the M.D. in 1945 and the D.Sc. (Birmingham) in 1954. He was admitted M.R.C.P. in 1946 and elected F.R.C.P. in 1952. During the second world war he served with the Royal Navy as senior medical officer to the Second Destroyer Flotilla, winning the D.S.C. at Narvik. In 1942 he was transferred to the Admiralty experimental diving unit which co-operated with the Medical Research Council's Royal Naval Personnel Research Committee in studies of under-water physiology. After the war Dr. Donald returned to St. Bartholomew's Hospital, where he was chief assistant on the professorial unit, and in 1948 he went with a Rockefeller fellowship to the United States. His next appointment was as senior lecturer at the Institute of Diseases of the Chest, London. In 1950 he became reader in medicine at Birmingham, and in 1954 was given the title of first assistant in the department of medicine there. Dr. Donald's publications have been on cardio-respiratory function, caisson disease, and resuscitation of the drowned and asphyxiated; a number of his papers have appeared in this *Journal*.

Peckham Diagnostic Centre.—Brigadier H. L. GLYN HUGHES, formerly senior administrative medical officer of the S.E. Metropolitan Board, has been appointed director of the proposed diagnostic medical centre at the Queen's Road Centre, Peckham. The diagnostic centre, besides being used for teaching general practice to senior students, will provide local general practitioners with facilities for radiological and pathological examinations, physiotherapy, minor operations, etc. The Nuffield Foundation is making a grant of £12,000 towards the capital cost of adapting the accommodation (estimated at £16,500), the S.E. Metropolitan Board is providing some staff and equipment, and the London County Council will meet the running costs—about £6,250 a year.

School for Educationally Subnormal.—On July 12 Dr. L. T. HILLIARD, physician superintendent of the Fountain Hospital, opened the London County Council's Rose Cottage School, Woolwich. This is stated to be only the second new school for educationally subnormal children to be built in London since the second world war. It is a day school for 160 boys and girls aged 5 to 16 years. Pupils are drawn from south-east London and north-west Kent, transport where necessary being provided by local education authorities. A speech therapist attends regularly. The school is in Welton Road, London, S.E.18, and the nearest station is Welling Station.

Royal Society of Medicine.—At a general meeting of fellows held on July 15 the following were elected honorary fellows of the Society: Mr. L. R. Broster, Dr. M. G. Candau, Professor William B. Castle, Professor Andre F.

Cournand, Professor D. Denny-Brown, Professor F. de G. d'Allaines, Professor Herwig Hamperl, Professor G. Miescher, Professor Newell Philpott, Professor Georges Portmann, and Dr. F. Parkes Weber.

Faculty of Ophthalmologists.—At the council meeting on July 11, the following were elected officers for 1958–9: *President*, Mr. L. H. SAVIN; *vice-presidents*, Mr. E. G. MACKIE and Professor G. I. SCOTT; *hon. treasurer*, Mr. A. MCKIE REID; and *hon. secretary*, Mr. E. F. KING.

Royal College of Surgeons of Edinburgh.—At a meeting of the College on July 15 the honorary fellowship was conferred on Dr. WARREN H. COLE, professor of surgery at Illinois University, and on Dr. I. S. RAVDIN, Barton professor of surgery at Pennsylvania University. The following were admitted F.R.C.S.Ed.:

S. M. S. Ashraf, D. W. Blair, R. C. Buchanan, P. Burgess, B. N. Chatterjee, M. C. Chenoy, J. S. G. Clark, J. T. F. de Graft-Johnson, E. J. England, D. S. Grewal, W. F. Hasan, G. Kerr, G. C. Liggins, J. McLenachan, P. S. Mathur, G. Muttuhamby, K. N. Nambudripad, K. J. O'Connor, S. L. Paton, G. R. A. Raad, E. F. Reye, M. C. R. Solling, J. W. W. Thomson, M. A. T. Tolley, M. P. Trivedi, D. D. Verma, R. E. D. Williams, J. S. Winter, and N. K. Yong.

Public Welfare Foundation Prize.—The College of General Practitioners is awarding this year six prizes of £40 each to senior medical students in the United Kingdom and Eire for the best case history, with suitable commentary, of one or more patients seen in general practice. Further information about the competition may be obtained from deans of medical schools, to whom details have been sent, or from the College of General Practitioners, 41, Cadogan Gardens, London, S.W.3. The closing date for entries is August 1.

Purchase Tax on Crash-helmets.—The Finance Bill has been amended so as to make helmets designed to protect the head from injury not chargeable under Group 3 (Headgear) of the Purchase Tax Schedule as from July 17. This relief applies to protective helmets fitted with an inner cradle (e.g., crash-helmets and firemen's helmets), and also to other kinds of protective helmets (e.g., for policemen). It does not extend to specially reinforced headgear other than helmets (e.g., huntsmen's bowlers); nor does it cover helmets suitable for use only in sports.

Procedure in Criminal Courts.—Dr. T. C. N. GIBBENS, senior lecturer in forensic psychiatry at the Institute of Psychiatry, is the sole medical member of the interdepartmental committee, under Mr. Justice STREATFEILD's chairmanship, recently appointed by the Home Secretary to review the business of the criminal courts. One of the committee's tasks will be to advise on existing arrangements for providing the courts with the information necessary to enable them to select the most appropriate treatment for offenders.

London University.—The title of emeritus professor of physiology has been conferred on Professor K. J. FRANKLIN, F.R.S., on his retirement from the chair of physiology at St. Bartholomew's Hospital Medical College. The title of professor of pharmacology and therapeutics has been conferred on Dr. R. S. STACEY in respect of his post at St. Thomas's Hospital Medical School, and the title of professor of pharmacology on Dr. ELEANOR ZAIMIS in respect of her post at the Royal Free School of Medicine.

Leeds University.—Mr. F. W. SHEA has been appointed tutor in orthopaedic surgery for an initial period starting on August 16.

N.W. Metropolitan Board.—Dr. F. J. FOWLER is to succeed Dr. H. M. C. MACAULAY as senior administrative medical officer. Dr. Macaulay retires on July 31.

Queen's Commendation.—Dr. N. J. JACKSON, of the Minehead and West Somerset Hospital, has received the Queen's Commendation for Brave Conduct for services when a youth fell down a cliff.

COMING EVENTS

Rheumatic Fever and Rheumatic Heart Disease.—Symposia for 30 consultant physicians, September 22–25 at the Postgraduate Medical School and the Canadian Memorial Hospital, Taplow. The fee is four guineas. Further details are given at p. 46 of the advertisements.

Société Française d'Otorhinolaryngologie.—Annual congress in Paris, October 20–23. Main subjects will be cancer of the tongue, and cortisone and corticotrophin. Details from the secretary-general, 6, Avenue MacMahon, Paris.

American Public Health Association.—36th annual meeting, October 27–31, in St. Louis. Details from the association, 1790, Broadway, New York, 19, N.Y.

Artificial Limbs and Appliances Centre, Roehampton.—Courses for orthopaedic consultants from October 13 to 17, and for physical medicine consultants October 29 and 30. Details from the Centre, Roehampton House, London, S.W.15.

NEW ISSUES

SPECIALIST JOURNALS AND ABSTRACTS

British Heart Journal.—Issued quarterly (£3 annually). The new issue, Vol. 20, No. 3, includes:

HEART: 1909-1958.
LOUIS GALLAVARDIN.
HAEMODYNAMIC CONSEQUENCES OF CORONARY HEART DISEASE. Ottar Müller and Karl Rørvik.
THE DIAGNOSTIC USE OF AN EAR OXIMETER IN CONGENITAL HEART DISEASE. C. R. Woolf, W. Paul, and R. W. Gunton.
THE DIAGNOSIS OF MITRAL INCOMPETENCE FROM LEFT ATRIAL PRESSURE CURVES. Bertrand G. Wells.
CLINICAL AND RADIOLOGICAL ASPECTS OF CALCIFICATION OF THE MITRAL REGION. Eino Linko and Erkki Sysimetsä.
ATRIAL DISSOCIATION. Mario Gomes Marques.
DIRECT LEFT ATRIAL PRESSURE TRACINGS AND THE DEGREE OF MITRAL OBSTRUCTION. Stanley R. McCampbell.
EVIDENCE FOR PULMONARY VASOCONSTRICTION IN MAN. Richard Gorlin, Frank B. Clare, and Joseph J. Zuska.
A SURGICAL STUDY OF COARCTATION OF THE AORTA. Rowan Nicks.
ELECTROCARDIOGRAMS WITH SHORT P-R INTERVAL AND ABERRANT QRS COMPLEX. L. M. Sanghvi and S. N. Misra.
VENTRICULAR SEPTAL DEFECT WITH PULMONARY STENOSIS AND AORTIC REGURGITATION. D. M. Collins, T. East, M. P. Godfrey, P. Harris, and S. Oram.
THE AORTIC SYSTOLIC MURMUR DEVELOPING WITH INCREASING AGE. D. L. Bruns and L. G. Van Der Hauwaert.
VENTRICULAR SEPTAL DEFECT WITH PULMONARY STENOSIS. L. Brotmacher and Maurice Campbell.
THE ROLE OF VENOUS CONSTRICTION IN CIRCULATORY DISORDERS. János P. Radó, Endre Gonda, and Erwin Kovács.
PULMONARY FUNCTION IN PULMONARY HYPERTENSION. M. B. McIlroy and G. H. Apthorp.
THE RIGHT VENTRICLE AND THE SMALL PULMONARY ARTERIES IN COAL-WORKERS. Arthur J. Thomas and W. R. L. James.
CORONARY ARTERY CATHETERIZATION DURING THORACIC AORTOGRAPHY. A. M. Johnson and William D. Logan.
THE ELECTROCARDIOGRAM IN PROGRESSIVE MUSCULAR DYSTROPHY. G. W. Manning and G. J. Cropp.
CASE REPORTS:
PATENT DUCTUS ARTERIOSUS WITH VENTRICULAR SEPTAL DEFECT. G. L. Higgins.
PATENT DUCTUS ARTERIOSUS WITH MITRAL STENOSIS. J. Mackinnon and R. M. Briggs.
INCOMPLETE RUPTURE OF THE ASCENDING AORTA WITH SECONDARY ANEURYSM. John Wedgwood.
INCOMPETENT CONGENITAL BICUSPID RIGHT ATRIO-VENTRICULAR VALVE. N. Coulshed.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Persey.—On July 11, 1958, to Drs. Joyce and Alec Persey, of Nottingham Road, Long Eaton, a sister for Nicola—Janet Celia.
Sinclair.—On May 23, 1958, at Zomba, Nyasaland, to Drs. Olive and Wilfred Sinclair, a son—Richard William Fleming.
Wolfson.—On July 1, 1958, at Dudley Road Hospital, Birmingham, to Nancy, wife of L. J. Wolfson, F.F.A. R.C.S., a daughter.

DEATHS

Braithwaite—On July 5, 1958, at his home, Daisy Bank, Woolfold, Bury, Lancs, Percy Frank Braithwaite, M.B., aged 81.
Chitty.—On July 9, 1958, at his home, Eastcote, Chaddesley Corbett, near Kidderminster, Worcs, Keith Chitty, F.R.C.S., aged 38.
Fraser.—On July 8, 1958, as the result of an accident, Andrew Mearns Fraser, M.D., D.P.H., of Curts, Hayling Island, Hants, aged 90.
Murley.—On July 6, 1958, David Ronald Murley, M.R.C.S., L.R.C.P., D.R.C.O.G., of Mullion, Cornwall, aged 35.
Sharpe.—On July 9, 1958, Edward Stevenson Sharpe, M.B., Ch.B., of 227, Bingley Road, Shipley, Yorks, aged 79.
Wishart.—On July 18, 1958, George Macfeat Wishart, M.D., F.R.F.P.S., of Glasgow, aged 62.

Any Questions?

We publish below a selection of those questions and answers which seem of general interest. It is regretted that it is not possible to supply answers to all questions submitted.

Analgesics for Incurable Carcinoma

Q.—*What combinations of analgesic drugs have been found to be most useful in the relief of pain in cases of incurable carcinoma?*

A.—A combination of morphine 15 mg. (gr. ¼) with chlorpromazine (25 mg.) is often very valuable. The latter, besides alleviating any nauseating effect produced by morphine, also potentiates its sedative action. The following prescription is often remarkably effective in relieving pain and raising the morale: morphine, 15 mg. (gr. ¼); cocaine hydrochloride, 10 mg. (gr. ⅙); sodium phenobarbitone, 30 mg. (gr. ½); gin, 16 ml.

"Sarkomycin"

Q.—*What is sarkomycin?*

A.—Sarkomycin is one of several extracts made from *Streptomyces erythrochromogenes* that have antibacterial properties and are also active against certain experimental tumours. Umezawa *et al.*[1] reported temporary regressions in cases of carcinoma of the stomach, thyroid, and oesophagus. Magill *et al.*[2] at the Sloan Kettering Institute, New York, tested sarkomycin in 26 patients suffering from advanced malignant disease. They gave the maximum tolerated dose in every case. Anorexia, nausea, and vomiting were severe and all patients complained of pain at the injection site. Sarkomycin was given intravenously, and spasm of the vein and thrombosis or thrombophlebitis were common. Five patients showed minor subjective improvement difficult to assess, but in no instance was objective benefit recorded. The series was small and the disease extensive in all cases, but in view of the severity of the side-effects and the poor therapeutic results sarkomycin does not seem a promising agent in the treatment of malignant disease.

Hooper *et al.*[3] attempted to purify sarkomycin. They obtained samples of which the active biological constituent was 2-methylene-3-oxo-cyclopentane carboxylic acid. This substance was antibacterial and also inhibited the growth of the Ehrlich ascites tumour in mice. The reduced form of the compound lacked antibacterial activity, but retained its action against the tumour. The purified samples were considerably more active in experimental conditions than the preparations that had been used in clinical trials. The pure substance does not yet appear to have been tested clinically.

REFERENCES

1 Umezawa, H., Yamamoto, T., Takeuchi, T., Osato, T., Okami, Y., Yamaoko, S., Okuda, T., Nitta, K., Yavishita, K., Utahara, R., and Umezawa, S., *Antibiot. and Chemother.*, 1954, **4**, 514.
2 Magill, G. B., Golbey, R. B., Karnofsky, D. A., Burchenal, J. H., Stock, C. C., and Rhoads, C. P., *Cancer Res.*, 1956, **16**, 960.
3 Hooper, I. R., Chency, L. C., Cron, M. J., Fardig, O. B., Johnson, D. A., Johnson, D. L., Palermiti, F. M., Schmitz, H., and Wheatley, W. B., *Antibiot. and Chemother.*, 1955, **5**, 585.

Barrier Creams

Q.—*What is the best barrier cream against chemicals such as phenylbenzolate, benzoylchloride, and various aldehydes used in scent-making, particularly one which would be proof against the various aldehydes?*

A.—This is a difficult question. There are two main types of barriers, one water-soluble and the other water-repellent, and it is among the various examples of the former type that one might be found to give some protection against the risk of dermatitis principally from organic solvents and aldehydes. However, in the work indicated—which does carry a risk of dermatitis—it would be better to rely on minimum (or no) skin contact than to pin any great faith on any barrier, however cunningly compounded. Careful washing after work combined with the principle of minimum contact is the best safeguard, and in addition the use after work of a skin-conditioning cream will probably prove effective for all but the especially susceptible worker. Ideally, medical supervision should be added to fit the cloak of protection.

Carpal Tunnel Syndrome

Q.—*Is hydrocortisone injection advised for the carpal tunnel syndrome?*

A.—Injection of hydrocortisone for the carpal tunnel syndrome is not advised. The results of operative treatment are so good, and the operation itself so trivial, that conservative treatment is probably never in the patient's best interests. It is difficult to see what hydrocortisone could do to relieve compression of the median nerve in the carpal tunnel, and the indiscriminate and unscientific use of hydrocortisone in conditions for which it is clearly not indicated is to be deplored.

Hepatitis and Plasma Transfusion

Q.—*What is the average incidence of hepatitis due to the icterogenic virus following the intravenous administration of plasma? Why is human serum albumin not used more in Britain?*

A.—The incidence of hepatitis attributed to the transfusion of plasma has usually been based upon the occurrence of jaundice in the recipients 40 to 150, occasionally 200, days after transfusion. The incidence can be ascertained with reasonable accuracy only by follow-up surveys of recipients six months after transfusion; however, it is often difficult or impossible to decide whether the disease is to be attributed to other parenteral injections or to infection with the virus of infectious hepatitis. The association of several cases of jaundice with one batch of plasma may assist in making the decision.

Since 1945 all the plasma made for distribution in England and Wales has been dried small-pool plasma, which is prepared from not more than ten donations of blood; each pool yields four to five bottles of dried plasma, so that a pool cannot be given to more than this number of individuals and will very often be given to a smaller number or to only one individual. It is frequently, therefore, impossible to investigate more than a few patients associated with any given batch; the differentiation between homologous serum jaundice and hepatitis due to other causes is thus rendered more difficult. Most patients also receive, in addition to plasma, whole blood which may itself transmit the causative agent. In the most recent survey[1] the incidence of jaundice after transfusion of dried small-pool plasma with or without blood was found to be little different from that after whole blood alone—slightly less than 2 per 1,000 patients followed up.

Human albumin was first made in the U.S.A. during the second world war for the United States Navy for the treatment of casualties suffering from wound shock, because it could be prepared as a concentrated solution and its containers therefore occupied relatively less space than an equal number of bottles of plasma or dried serum. While it could be used with good results instead of plasma for the restoration of plasma volume, it was found desirable to give fluids such as glucose-saline simultaneously, especially in the presence of dehydration. It was first prepared in Britain after the war.[2] Its preparation is expensive, and about 60–70% of the theoretical yield is obtained. The expectation that albumin would be of especial value in the treatment of nephrosis has not been fulfilled. Its value in treatment of cirrhosis of the liver is still being investigated.

REFERENCES

1 Ministry of Health, Medical Research Council and Department of Health for Scotland, *Lancet*, 1954, **1**, 1328.
2 Kekwick, R. A., and Mackay, M. E., *Spec. Rep. Ser. med. Res. Coun.*, 1954 No. 286. London.

Brucella Abortus in Milk

Q.—*What should be done when samples of tuberculin-tested, unpasteurized milk are found to contain Brucella abortus?*

A.—There is no obligation on local authorities to take any action when milk is shown to contain *Br. abortus*, although they are obliged to do so if the organism found is *Br. melitensis*: the usual course in that uncommon event is to prohibit marketing of the milk pending further investigation.

A proceeding which safeguards the consumer, and should involve no hardship to producer or retailer, is to require that milk from the infected source be pasteurized. Investigations can then be made to trace the exact source of the infection. The "ring" test, an extremely simple test for *Brucella* agglutinin in milk, will serve to identify first the herd and then the individual animal(s) responsible. Final results may be verified by the whey agglutination test and culture or guinea-pig inoculation. If only one or two animals are affected, and the herd is a good one and well protected against reinfection, the elimination of these animals is in the farmer's interests as well as in those of the public health.

Resistance to Insecticides

Q.—*What is the difference between a mosquito's "tolerance" and "resistance" to an insecticide? How can mosquitoes be controlled if they develop tolerance or resistance?*

A.—There is no universally accepted terminology for resistance to insecticides, but certain facts are generally agreed. As is the case with other insects, some kinds of mosquito in their natural state are found to be more difficult to kill with insecticides than others; so that one can say that one species is more susceptible and another more tolerant. There is evidence that natural tolerance can be augmented, to some degree, by breeding from the strongest individuals; this produces a race showing "vigour tolerance" towards all kinds of poison.

The word "resistance" is now usually employed to describe a rather high degree of specific immunity to a particular type of insecticide. In several instances it has been shown to be due to a single gene, inherited in a normal Mendelian way. Whereas vigour tolerance can often be overcome by increased dosage, true physiological resistance generally protects the insect from poisons of a particular kind, so that an entirely new sort of insecticide must be employed. Thus, D.D.T.-resistance generally involves resistance to similar compounds, such as methoxychlor, etc. B.H.C.-resistance protects insects from chlordane, dieldrin, and other cyclodiene insecticides. A third type of resistance, to the organo-phosphorus compounds, is less well understood, but appears to involve a number of insecticides of this kind. Apart from changing to a different class of insecticide, there is nothing that can be done about resistance at present other than to revert to control methods in vogue before the introduction of the new synthetic insecticides.

Treatment for Roundworms

Q.—*What is the most effective treatment for roundworms?*

A.—In eradicating roundworm infections there is little to choose between hexylresorcinol and piperazine adipate or hydrate. Both are administered in a single dose, but hexylresorcinol must be given in a cachet, otherwise it would cause irritation of the buccal mucous membrane. It is therefore unsuitable for administration to children who are too young to swallow a cachet. It is also important that the cachet should be made of rice paper or other readily dissolved medium, for the drug would not otherwise be liberated until it had possibly passed so far down the intestine that it had passed some of the worms and was therefore unable to act upon them. Piperazine salts are more expensive than hexylresorcinol. The adipate is dispensed in tablets and is therefore suitable for administration to adults; piperazine hydrate is dispensed in the form of an elixir and is therefore a convenient preparation for administration to children.

Tetrachlorethylene is also effective against roundworms, but stimulates them to considerable activity, and in heavy infections damage and possibly even perforation of the intestinal wall could occur.

Dosages suitable for the treatment of adults suffering from roundworm infections are hexylresorcinol 1 g.; piperazine adipate 25 mg. per kg. and piperazine hydrate 50–75 mg. per kg. of the patient's body weight; and tetrachlorethylene 4 ml. emulsified in mucilage. All are given in the morning, the patient having had nothing to eat since approximately 4 p.m. on the previous day. One hour after the administration of the anthelmintic a saline purge should be given.

NOTES AND COMMENTS

Thin and Greasy Hair.—Dr. AGNES SAVILL (London, W.1) writes: For the treatment of early baldness in young men ("Any Questions?" June 7, p. 1365), rubbing and massage must be clearly distinguished. Correct massage does not involve "friction between the fingers, the hair, and the scalp" ("Notes and Comments," July 5, p. 62). For correct massage the tissues over the skull must be lifted and given rapid vibration. In my book[1] I give records of successful cases. On page 91 the method of correct massage and vibration is described. The treatment must be followed every day for 15–20 minutes. A downy regrowth results, but falls again when treatment is arrested. Naturally, few have the perseverance to continue this treatment for long periods. Supplementary treatment at intervals with ultra-violet light and a small high-frequency glass electrode also promotes a downy regrowth. Many years ago this was so promising that my patients believed the problem had been solved, but in the majority of cases the down again fell away.

REFERENCE

[1] Savill, A., *The Hair and Scalp*, 1952. London.

Corrections.—In our report of Dr. N. W. HORNE's remarks at the meeting of the Section of Thoracic Medicine and Surgery at Birmingham (July 19, p. 154), the word "helpful" in the third line should have been "harmful," and "renal" in the last line should have been "adrenal."

In the report of Dr. GWEN HILTON'S contribution to the Seventh International Cancer Congress (*Journal*, July 19, p. 161) it was stated that, of 38 patients treated by radical radiotherapy alone, 8 had lived for 15 years without recurrence. This should have been 5 years, *not* 15 years.

Collected Articles from the "British Medical Journal"

The following books are available through booksellers or from the Publishing Manager, B.M.A. House. Prices, which include postage, are now the same for both inland and overseas.

Emergencies in General Practice (26s. 9d.).

Refresher Course for General Practitioners, Volumes 2 and 3 (26s. 9d.).

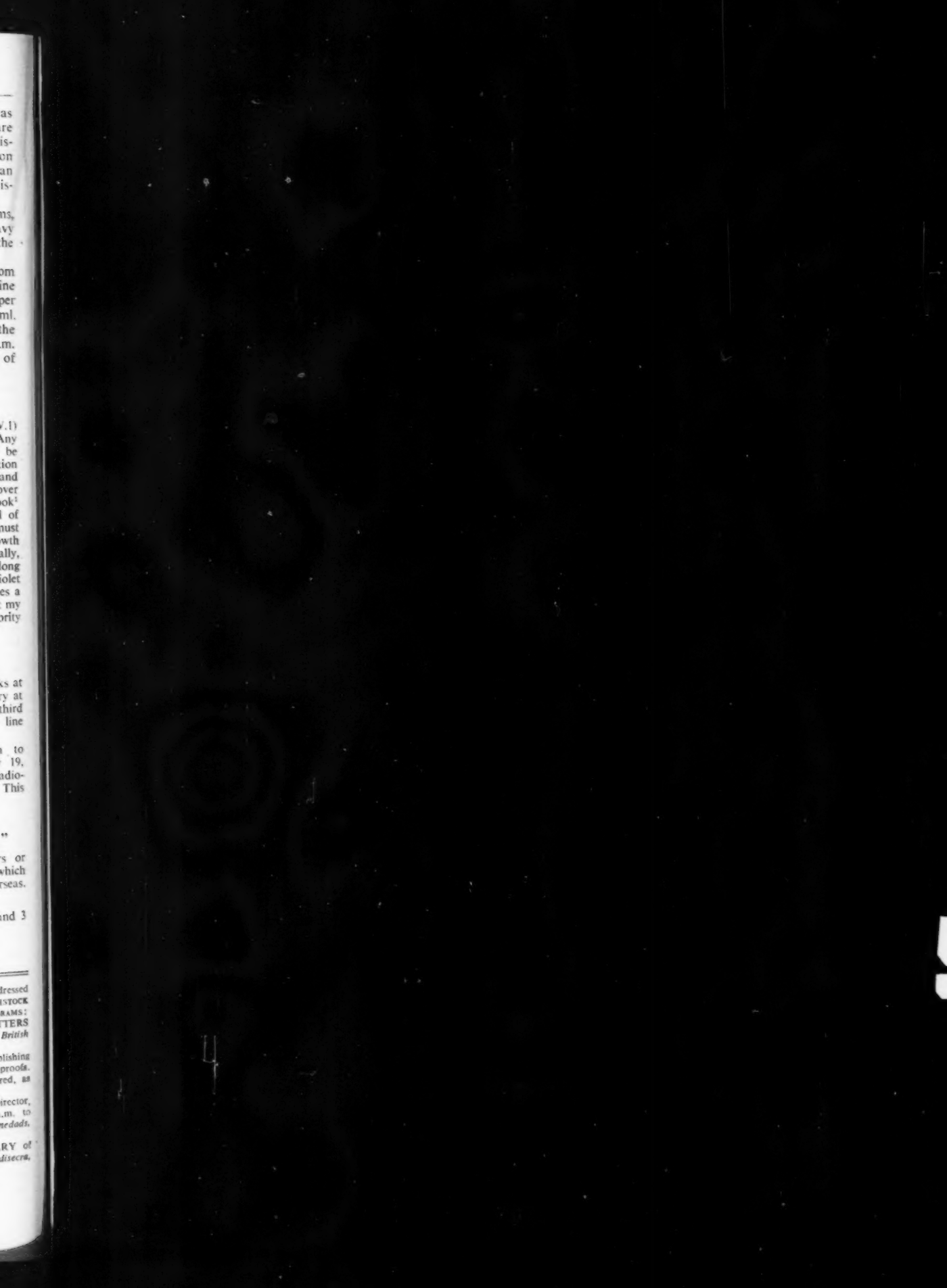
Clinical Pathology in General Practice (22s. 3d.).

Any Questions?, Volumes 2 and 3 (8s. 3d. each).

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 4499. TELEGRAMS: *Aitiology, Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

Authors desiring REPRINTS should communicate with the Publishing Manager, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors overseas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

ADVERTISEMENTS should be addressed to the Advertisement Director, B.M.A. House, Tavistock Square, London, W.C.1 (hours 9 a.m. to 5 p.m.). TELEPHONE: EUSTON 4499. TELEGRAMS: *Britmedads, Westcent, London.*

MEMBERS' SUBSCRIPTIONS should be sent to the SECRETARY of the Association. TELEPHONE: EUSTON 4499. TELEGRAMS: *Medisecra, Westcent, London.*

B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.